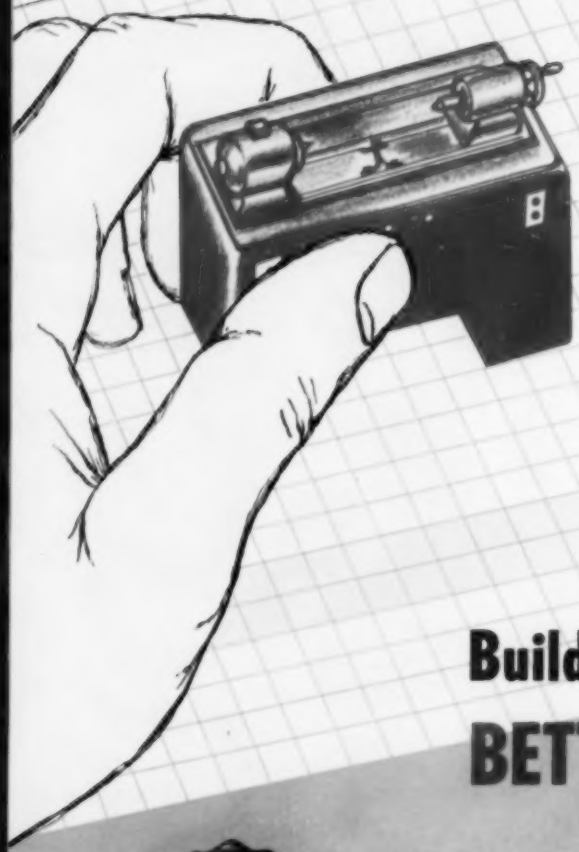
APRIL 18, 1955

STEEL

THE WEEKLY MAGAZINE OF METALWORKING



Build in economy through

BETTER PLANT LAYOUT

—page 93

A PROGRAM FOR MANAGEMENT IN 1955

No. 3 in 1955 Management Series

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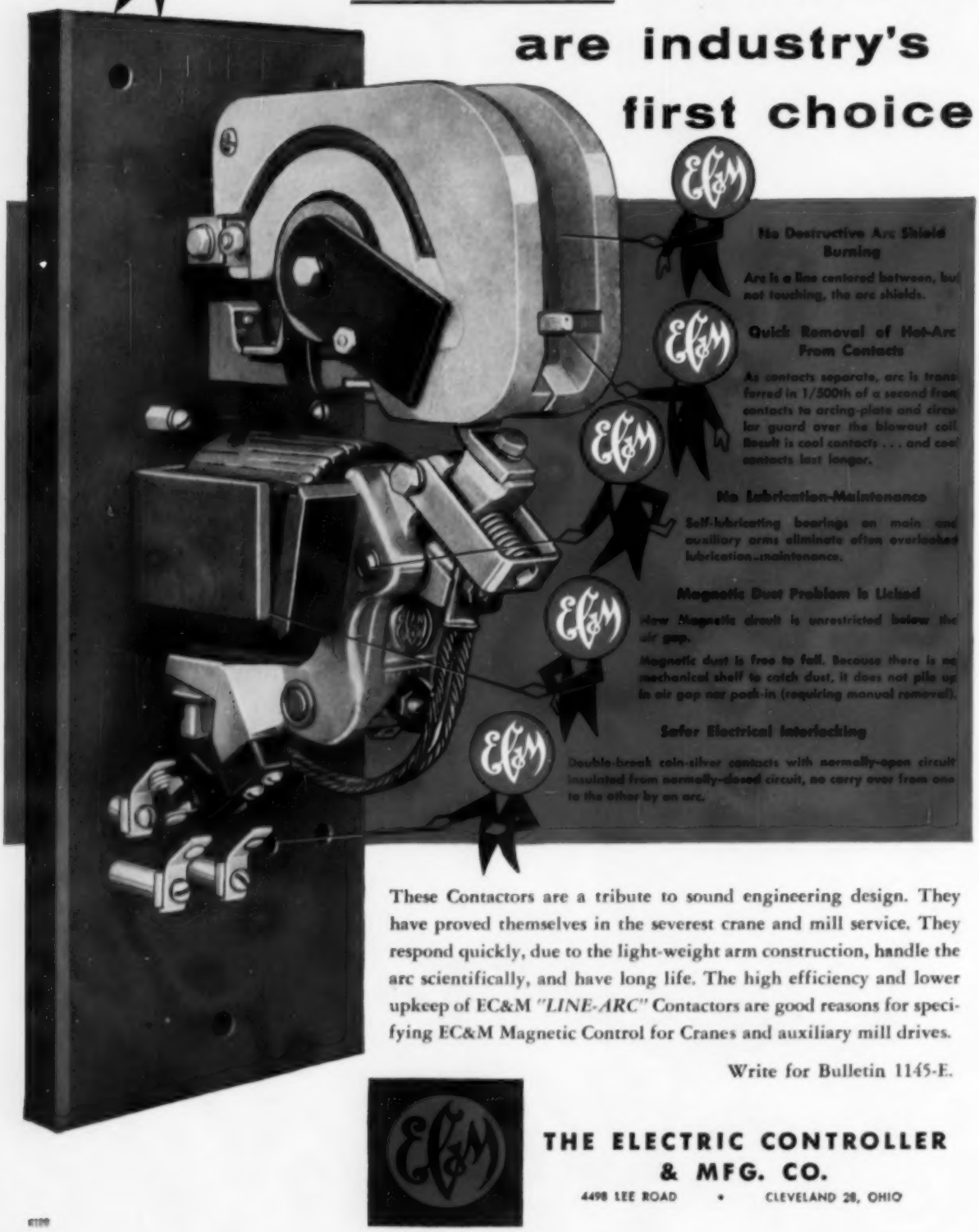
here's why LINE-ARC contactors are industry's first choice



No Destructive Arc Shield Burning

Arc is a line centered between, but not touching, the arc shields.

Quick Removal of Hot-Arc From Contacts

As contacts separate, arc is transferred in 1/500th of a second from contacts to arcing-plate and circular guard over the blowout coil. Result is cool contacts . . . and cool contacts last longer.

No Lubrication-Maintenance

Self-lubricating bearings on main and auxiliary arms eliminate often overlooked lubrication-maintenance.

Magnetic Dust Problem is Licked

Here Magnetic circuit is unrestricted below the air gap.

Magnetic dust is free to fall. Because there is no mechanical shelf to catch dust, it does not pile up in air gap nor pack-in (requiring manual removal).

Safer Electrical Interlocking

Double-break coin-silver contacts with normally-open circuit insulated from normally-closed circuit, no carry over from one to the other by an arc.

These Contactors are a tribute to sound engineering design. They have proved themselves in the severest crane and mill service. They respond quickly, due to the light-weight arm construction, handle the arc scientifically, and have long life. The high efficiency and lower upkeep of EC&M *"LINE-ARC"* Contactors are good reasons for specifying EC&M Magnetic Control for Cranes and auxiliary mill drives.

Write for Bulletin 1145-E.

THE ELECTRIC CONTROLLER & MFG. CO.

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4199

You can depend on the man from Bethlehem

Most every day of the year Bethlehem metallurgical contact men are calling on customers. Recommending the right steel for the job. Helping to solve all sorts of metallurgical problems. In fact, many of our customers have come to look upon the man from Bethlehem almost as one of their own people.

If you have a problem involving the selection, treatment or use of carbon-steel bars, feel free to ask for this metallurgical contact service. You will find the man from Bethlehem well qualified to help you—well-trained, widely experienced. In every way, a good man to have around. A man you can depend on. Meanwhile, now's the time to place your order for Bethlehem Hot-Rolled Carbon Bars. They are available in standard or special sections, and in bar-size shapes. Also semi-finished carbon-steel products: blooms, billets, slabs and strip. We suggest that you phone or write the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

"bearing maintenance negligible"

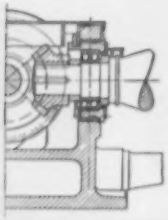
on UNITED®
Blooming and Slabbing Mill Tables
SKF EQUIPPED

That's the report from United Engineering and Foundry Company who first tried out SKF Spherical Roller Bearings on mill equipment more than 25 years ago . . . since then on blooming and slabbing mill tables.

Then it was an innovation; now it's *a trend!*

Pictured here are United Engineering and Foundry installations in three mills—all in service over two years.

Throughout the steel industry, SKF Spherical Roller Bearings are not only going into *new* mills, but are also replacing other types of bearings that have been tried and found wanting in existing mills.



APPLICATION – Drawing shows how designers apply SKF Spherical Roller Bearings to both approach and delivery tables of blooming mills like the United Engineering & Foundry installation at Granite City.

SIGNIFICANCE – Table roll bearings under the manipulators particularly must be able to take it—*heavy, intermittent radial load—thrust load—shock load!* SKF Spherical Roller Bearings stand up in this application and there is *no* "pounding-out" of housing bores.

The three reasons that could make SKF Spherical Roller Bearings the answer to your anti-friction problems are:

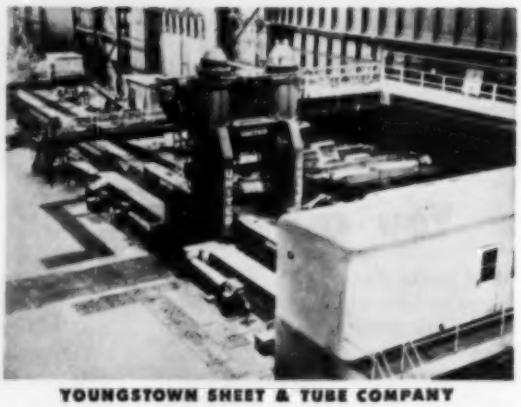
1. Size for size, SKF Sphericals provide highest capacity.
2. Like all SKF bearings, they are made to the industry's highest quality standards.
3. SKF Field and Home Office Engineers, with many types and sizes of *ball* and *roller* bearings to choose from, can provide unbiased and sound advice on how and where to install what bearing.

7621

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA., *manufacturers of* SKF *and* HESS-BRIGHT® *bearings.*

GRANITE CITY STEEL COMPANY

LONE STAR STEEL COMPANY



YOUNGSTOWN SHEET & TUBE COMPANY

SKF®

BALL AND ROLLER BEARINGS

Here's Rope that takes the toughest service!

MONARCH WHYTE STRAND Wire Rope by MACWHYTE

This top quality Rope is available in all classifications—in the size and construction that will serve best on your equipment. MONARCH WHYTE STRAND is highest strength Wire Rope, made of Improved Plow Steel.

To meet the needs of all equipment and the toughest of service conditions, there are a thousand and one types, sizes, and grades of MONARCH WHYTE STRAND Rope. Each of the Wire Ropes in this selection is designed to fill an equipment need and to assure longer, safer service at lower operating cost.

These Ropes are available Internally Lubricated, PREformed, Lang Lay or Regular Lay, Fiber Core, or Independent Wire Rope Core. Wire combinations vary from 42 wires in 6 x 7 construction to 343 wires in 6 x 49 IWRC construction.

Put MONARCH WHYTE STRAND Wire Rope on your equipment. Enjoy the advantages of having the rope that will take the toughest service.

1074

Ask for
MONARCH WHYTE STRAND
Bulletin 5425.

For the proper Wire Rope size and construction for your equipment, request a Macwhyte recommendation.

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It helps the Fireman save that child

BURNING problem for engineers of a large, fire-fighting-equipment manufacturer was the compact V-belt drive on their high-pressure, water-pumping units. Standard belts sometimes failed at the height of the first fire they fought.

Since failure at a fire couldn't be risked, the G.T.M.—Goodyear Technical Man—was consulted. He specified matched sets of COMPASS-V-Steel Belts, sinewed with airplane-type steel cables to handle the heavy loads without a slip. And they do.

Firemen report these precision-built belts operate two to three years *without a single take-up*. Perhaps they can do the same for you. Find out by seeing the G.T.M., your Goodyear Distributor or writing Goodyear, Industrial Products Division, Akron 16, Ohio or Lincoln, Nebraska.

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

COMPASS-V-STEEL BELTS by

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

This Week in Metalworking

STEEL
THE WEEKLY MAGAZINE OF METALWORKING

Vol. 136 No. 16 April 18, 1955

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Editorial, Business Staffs—16. Advertising Index—175. Editorial Index available semiannually. STEEL is also indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Published every Monday by the Penton Publishing Company, Penton Building, Cleveland 13, O. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $7.50; two years $15; all other countries, one year $20. Single copies (current issues) 50 cents. Metalworking Yearbook issue $2.00. Accepted as controlled circulation publication at Cleveland, O. Copyright 1955 by Penton Publishing Co.

TAKE TIME OUT

Cancer strikes 1 in every 4 Americans. It strikes with vicious swiftness. Too often it is discovered — too late.

To protect yourself and your family, have a thorough medical examination every single year without fail. Six months after such an examination, every woman over 35 should return for a pelvic checkup. Every man over 45 should have a chest X-ray twice each year. *Many cancers can be conquered if caught in time!*

STRIKE BACK AT CANCER... MAN'S CRUELEST ENEMY

Give to
AMERICAN
CANCER SOCIETY

Coming May 2 IN STEEL

What's Happening to Job Shops?

Circumstances are developing to take some of the wind out of that bellows of industry, the job shop. The stampers, the platers, the foundrymen and many others who do contract manufacturing to make parts for other industries, must meet the increasing threat of competition from their own customers. The auto industry, particularly, is building its own plating lines, foundries, stamping facilities, and that means less business for the job shops who used to supply them. STEEL's May 2 article will give case studies to show what contract manufacturers are doing to offset those losses.

behind the scenes

They Dare To Ask

On a certain gloomy Friday afternoon, Karl Zollner, STEEL's eastern manager, found himself prowling the banks of the Delaware and wondering why people were supposed to love fat men and hate salesmen. Such utter nonsense, he thought. Just as baseless and nonsensical as the theory that business organizations automatically reject criticism. He fished about in his coat pocket and withdrew a copy of a letter that the Harnischfeger Corp. had mailed to its many customers. The letter was signed by G. A. Schmus, manager, Repair Parts Sales & Service Division, and Karl reread it with relish:

"Gentlemen," opened the letter, crackling smartly in the breeze that rippled the Delaware. "COMPLIMENTS are fine—we know, because we get lots of them from our many satisfied customers. CRITICISM, however, keeps us on our toes and helps us correct anything that might affect the kind of service our customers are entitled to, and the kind of service we want them to have . . . we are naturally proud of our organization; however, we want to be careful that we do not coast on our reputation, and if we have failed you at any time, I should like to have you tell us frankly what happened. Your suggestions will receive our best attention, and will help us to continue to serve you, and all of our customers, more efficiently."

Confidence in product quality, service and price is assurance, Karl reflected . . . and to the assured, all criticism is constructive.

A Hair-Raising Tale

The Lindberg Steel Treating Co., of Chicago, St. Louis, Rochester, N. Y., and Los Angeles, recently sent out a whimsical folder under the title of "After Hours." It quotes the American Iron & Steel Institute to the effect that 8000 tons of steel are used every year for bobby pins, and another 2000 tons for hairpins. The folder writer lets himself go as he whips out the piece, and we can't blame him. Ten thousand tons of steel riding around on the delightful little heads of our American women! It remained for Janie Smith, assistant editor of *Machine Design*, sister publication of STEEL, to make the proper comment.

"What a fascinating report," she said. "You might say it's enough to curl your hair."

Plant Layout

STEEL's Program For Management story this week calls attention to one of the untoward developments that have plagued industry, particularly since the War: Unplanned growth. You know yourself how many plants have grown just like Topsy; others expand purposelessly in all directions, like a pot of rice boiling over. Detroit editor Floyd Lawrence assembled stacks of information on efficient plant design, materials flow, handling arrangements and economical plant layout, and then took his hands from a steering wheel long enough to write the story. The result is a think piece you undoubtedly will file for reference.

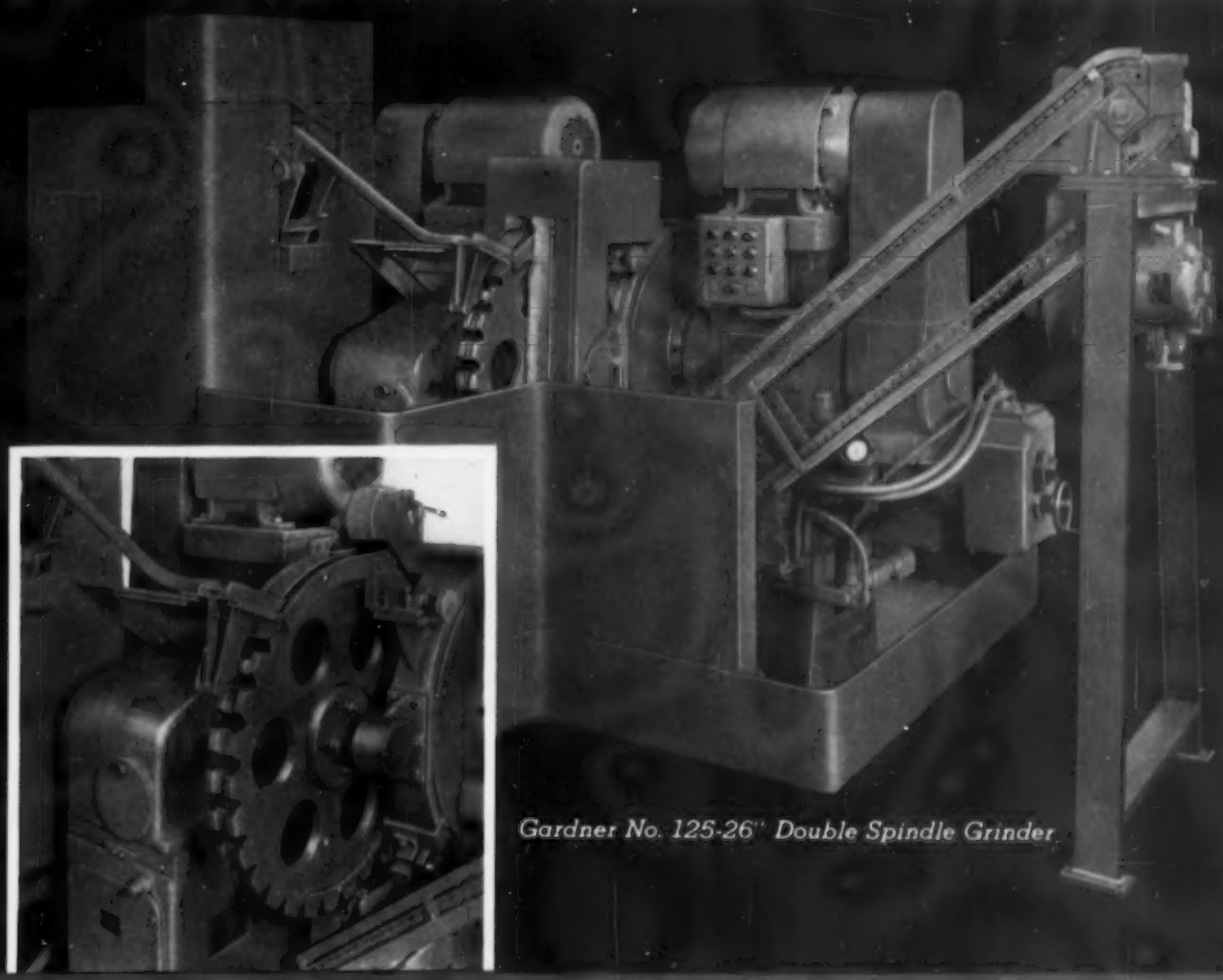
The Switched Hands

First one in with the correct solution to the marked-down raincoat sale problem was George W. Frederick, Republic Steel Corp., Moline, Ill. He was closely followed by A. W. Everest, General Electric Co., Pittsfield, Mass. Both agreed that there were 349 raincoats sold at $1.73 each.

If they have time, the gentlemen might try this one. A crosseyed reporter, who was addicted to strong drink as well as split infinitives, took time out one rainy afternoon to fix the large pocket watch his Uncle Horace had given to him. When he reassembled the instrument, he put the minute hand on the hour-hand spindle, and vice versa. Naturally, the hands began taking crazy positions, but eventually they reached a point where they told the correct time. The hands had been set at 2 o'clock. What was the first time thereafter they showed the correct time?

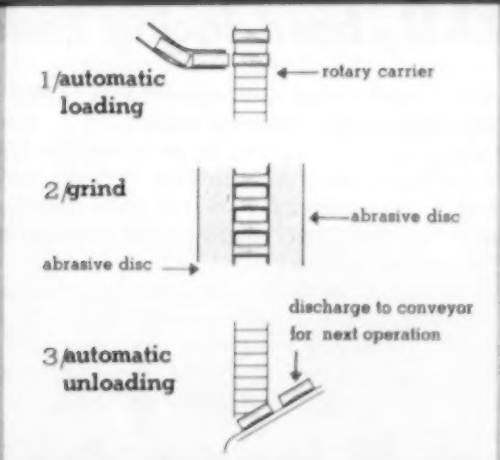
Shrdlu

(Metalworking Outlook—Page 47)



Gardner No. 125-26" Double Spindle Grinder

Automatic Operation Gives Grinding Output of 1800 Pieces per Hour



TWO parallel ends ground in ONE operation

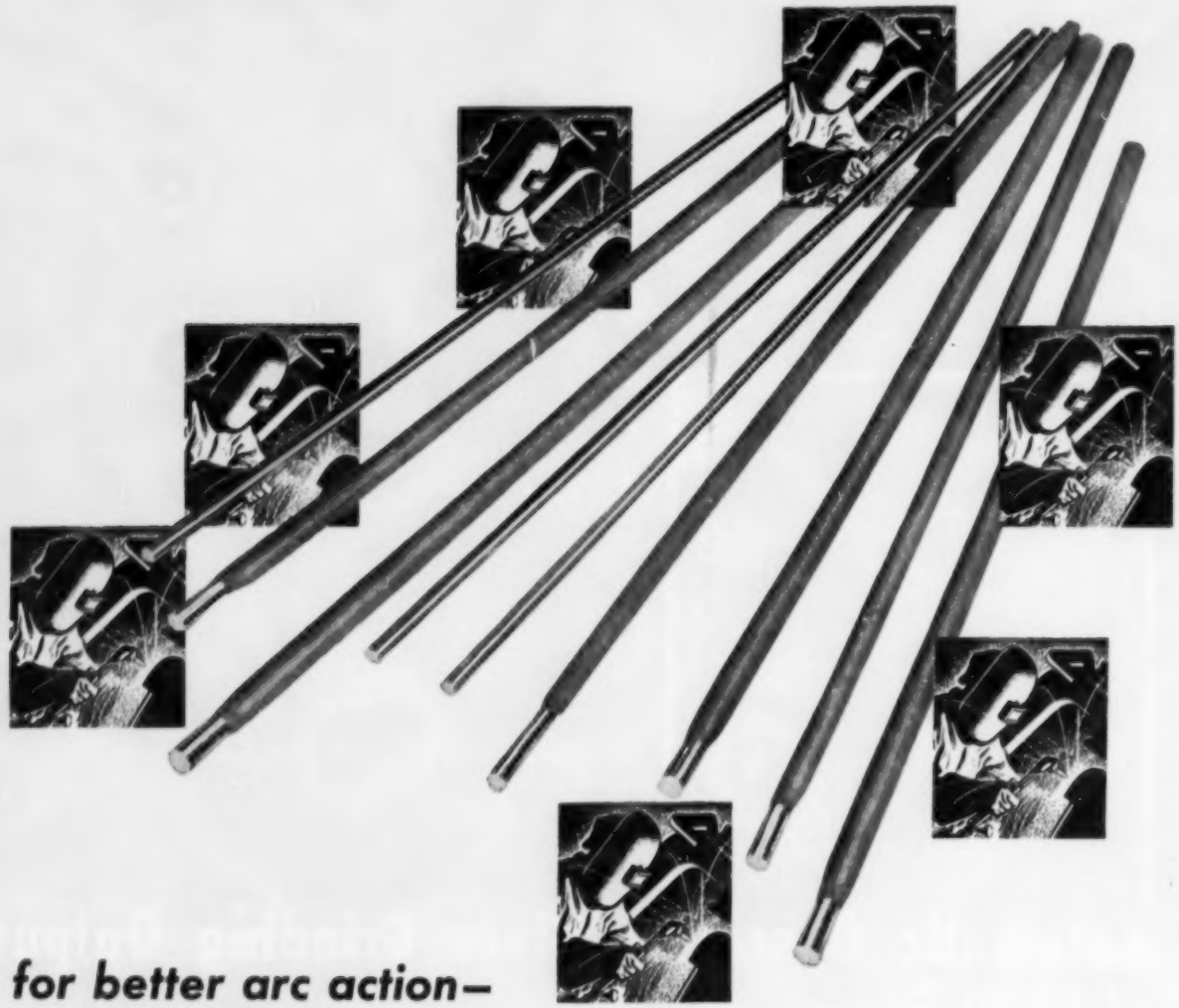
work data	
PART	Piston pin 3.026" long x .980" O.D. x .722" I.D
PRODUCTION	1800 per hour.
STOCK REMOVAL	.020" overall.
TOLERANCES	.0015" for parallelism; .0025" for uniformity.
ABRASIVES	2 Gardner Yellow Rim Wire-Lokt Discs.
TOOLING	Vee-notched rotary work carrier with hopper feeder and automatic unloading to conveyor.

GARDNER MACHINE COMPANY
414 Gardner St., Beloit, Wisconsin, U. S. A.

131M

GARDNER

precision disc grinders



for better arc action–

USE CRUCIBLE REXWELD, *hard-facing rods*

Rexweld low hydrogen coated electrodes are easy to apply. That's because they provide improved weldability . . . more stable and direct arc. Welding can be performed both in vertical and horizontal positions. And with Rexweld you'll get denser welds . . . no porosity. Parts will resist chipping, deformation or heat checking better . . . and they can be Rexwelded again and again.

Get Rexweld rods from your local Crucible warehouse in both low hydrogen coated electrodes and bare rods, in a wide range of grades and sizes. Next time you have a hard-facing application use Rexweld. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

GENERAL REFRACTORIES

FILET MIGNON—a la BRICK Sizzling, savory, juicy—dripping with butter—dashed with Worcestershire—and all of it brought to your table because of brick—refractory brick.

Refractories that contain the flames of industry. That produce the steel for your stove, your cabinets, your cooking utensils . . . provide the heat for the oven, the cold for the refrigerator . . . make rails, cars and engines which bring your steak to town; the wheels, body and motor of the truck which delivered it to the butcher. The platter on which it is served. The knife to cut it. The fork to eat it. The lights for the table. All—born of refractories.

Practically everything made or moved requires refractories. Refractories of almost infinite variety, prescribed and tailored for each special task.

Developing them, producing them, applying research to their improvement, drawing on resources all over the world, is the complete refractories service that we provide to industry, everywhere.

GENERAL REFRACTORIES COMPANY
PHILADELPHIA 2

A COMPLETE REFRACTORY SERVICE

OLIVE HILL— The world's most renowned blast furnace brick (it is a strong and dense fireclay product)—with superior resistance to slag, load, abrasion, carbon disintegration, and alkali attack.

RITEX—Unburned basic brick—in magnesite, magnesite-chrome, and chrome-magnesite. More resistant to spalling. Lower porosity, lower thermal conductivity —high hot strength.

STEELKLAD— A Ritex basic brick, permanently jacketed in a patented steel shell. Just one of many superior GREFCO products.

QUALITY CONTROL FOR MASS PRODUCTION. Days have been chopped to minutes by the installation of such equipment as this direct-reading spectrometer which can analyze beryllium copper alloys while they are still molten.

NEW MANUFACTURING FACILITIES INCREASE PRODUCTION, IMPROVE QUALITY OF "BERYLCO" BERYLLIUM COPPER

The production of beryllium copper, that uniquely versatile alloy which does so many jobs so well, has always been a complicated process. Beryl ore must be processed chemically to produce beryllium oxide. Master alloy is obtained by subjecting beryllium oxide, copper powder, and carbon to high temperatures in electric arc furnaces. Subsequent operations include ingot casting, soaking, annealing, pickling, hot and cold rolling, and drawing.

New technological advances—represented by a multimillion-dollar new investment in plant and equipment by The Beryllium Corporation—have successfully adapted basic quality control to large-scale production. Users of "Berylco" will reap the benefits. The spectrometer shown above, for instance, enables very close chemical control to be exercised in the production of the various beryllium copper alloys. New rolling mills produce strip to closer tolerances while enhancing over-all quality. These and other new tools produce sizes and forms not previously available—and in many cases have achieved economies which have already been passed on to users.

Write for engineering help or sample testing material.

ORE GRINDING MILL—a part of the fully integrated "Berylco" facilities.

NEW COLD-ROLLING STRIP MILL finishes beryllium copper to close tolerances.

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THE BERYLLIUM CORPORATION

DEPT. 5D. READING 19, PA.

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LETTERS TO THE EDITORS

Layout Is Confusing

I find the story, "Oxygen Steelmaking Arrives" (April 4, page 80), interesting and informative. My only criticism is directed toward the split-page layout. It's confusing to this reader.

H. B. Emerick
assistant director
Technical Services
Jones & Laughlin Steel Corp.
Pittsburgh

• *We appreciate your comment.—ED.*

Sweet Music

We are interested in your article, "House Organs Make Harmony" (April 4, page 39). May we have copies of it? Since we produce house organs and similar types of publications, we would like to spread the good word (especially in the vein in which you have written it) among our clientele. Can we reproduce your article in an educational campaign?

Charles C. Hottmann
advertising director
Stephens Printing Corp.
Sandusky, O.

May I have two tearsheets . . . ?

Gordon R. Wackett
manager of employee communications
Link Aviation Inc.
Binghamton, N. Y.

Please send me three copies . . .

Norman P. Gentieu
Technical Editorial Department
American Chemical Paint Co.
Ambler, Pa.

• *Copies sent and permission granted. —ED.*

Job Well Done

Your article, "Stamping Sales: Up 10% in '55" (April 4, page 36), was excellent. You did an outstanding job.

H. A. Daschner
acting managing director
Pressed Metal Institute
Cleveland

Instructive Pamphlet

We find the pamphlet, "Leasing, Its Pros and Cons," instructive. Please forward three copies.

G. H. Crais
office manager
Irby Bros. Machine & Iron Works
Gulfport, Miss.

• *Sent.—ED.*

Not New After All

The plunge-cut, rotary-shaving process described as "new" in the article, "Shaves Worktime in Half" (March 28, page 105), is really not new.

(Please turn to page 12)

Send for Your FREE Copy of these New Bulletins

HERE'S THE LATEST INFORMATION ON SOME WF Presses and Rolling Mills

HIGH SPEED BLANKERS—
Cir. No. 915-N-2

Detailed information on 2 sizes of presses for mass production blanking, piercing, shallow drawing and forming. Speed range 300 to 900 rpm. Shows machines from several angles, gives close-ups of design details and pictures typical work samples. Complete specifications included. 8 pages.

TANDEM ROD MILLS—
Cir. No. 729-R

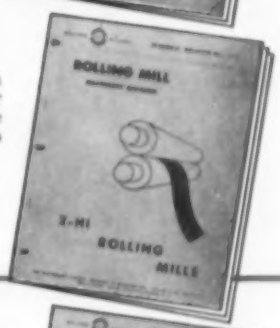
8-pager on mills for high speed reduction of non-ferrous and ferrous rod. Shows various sizes of mills plus work samples and a cross-sectional reduction sequence. Tells how mill can reduce operating costs. Also discusses pay off unit, straighteners, coilers and cooling method. Table gives capacities and other data.

MULTIPLE PLUNGER PILLAR PRESSES—
Cir. No. 754-N-2

8-page illustrated booklet presents latest features in WF multiple station pillar presses. Gives specifications and capacities for six sizes. Shows typical work samples and also covers accessory equipment.

2-HI ROLLING MILLS—
Bul. No. 111-R

Gives general information on wide variety of 2-Hi mills for cold or hot rolling. Rolls range from 5" dia. to 24" dia. Pictures five different sizes.



INCLINED, SHELL THREAD ROLLING MACHINE—
Cir. No. 833-EL-2

Describes and illustrates automatic inclined shell threader for attachment to eyelet machine or with independent feed. Covers use, construction, operation and drive. Shows work samples and has table of specifications.

WIRE FLATTENING MILLS—
Bul. No. 110-R

Gives information on mills with production speeds approaching 3,000 FPM. Shows various sizes. Rolls range from 4" dia. to 12" dia. Includes data on edgers, pay-offs, winders, drives, coolant system, etc.

BOLT, NUT & SCREW MACHINERY

POWER PRESSES

ROLLING MILLS

WIRE MILL EQUIPMENT

SENDZIMIR MILLS & OTHER SPECIAL MACHINERY

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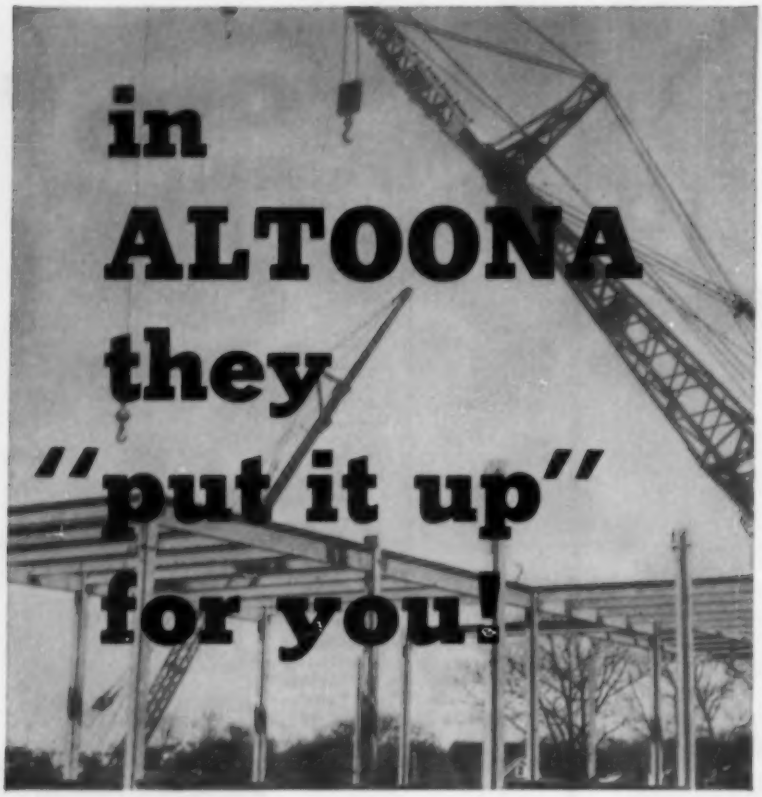
☐ 729-R ☐ 111-R ☐ 110-R

Name..... Title.....
Company.....
Address.....
City..... State.....

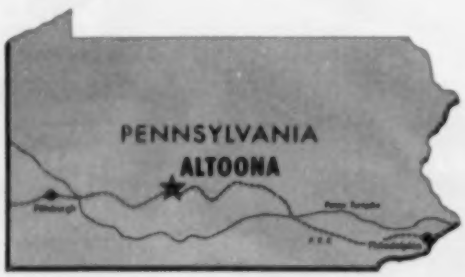


ONE MILLION DOLLARS AVAILABLE TO HELP FINANCE YOUR NEW PLANT

Non-profit rentals or *non-profit* amortization! That's how you make more profits in Altoona, Pennsylvania. Altoona Enterprises, Inc., an experienced community-sponsored agency, helps you finance your new factory on a sale or lease basis. If you're worried about labor—*don't.* Altoona offers you 8,000 men and 3,000 women with excellent records for efficiency and good labor relations. Transportation? Altoona's right on the PRR mainline and just thirty miles north of the famous Pennsylvania Turnpike. Don't make a move until you've checked Altoona.

FACTS ABOUT ALTOONA

Next to steel-making industry • Dozens of sites with utilities, railroad sidings • Vocational training in 11 skills • Adequate, modern housing • Home of SKF, National Radiator, Sylvania, Butcher & Hart and many others.



Write Dept. S-4
or phone ALtoona 3-8181
in confidence

ALTOONA Chamber of Commerce
Altoona, Pennsylvania

LETTERS

(Concluded from page 10)

Plunge shaving has been used for some time. Two Michigan Tool Co., radially-fed gear shavers were put in operation at the General Motors' Detroit transmission plant in 1951.

Edwin L. Karpick
Denham & Co.
Detroit

• *Thank you.—ED.*

Fence Posts or Plows?

In your article, "Where Finished Steel Went in 1954" (March 21, page 84), the classification, "agricultural," indicates shipment of 1,189,199 tons or 1.88 per cent of the total.

What does this classification include? Does it include shipments to the agricultural implement industry or does this total made consist of items such as fence posts, etc.?

D. C. Young
general product manager
Purchasing Department
Deere & Co.
Moline, Ill.

. . . are more details available from the American Iron and Steel Institute?

C. R. McGuire
manager
Sales Planning and Research
Reliance Electric and Engineering Co.
Cleveland

• *For further details, we suggest you write Mr. Don James, American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.—ED.*

Air Force Search

Your Technical Outlook column (Jan. 31, page 67), tells about Air Force research on a high-temperature material which may result from the bonding of silicon carbide with a metal or alloy to give a dense cermet. What is the source of your information?

M. Nachtweih
The National Research Bureau Inc.
Chicago

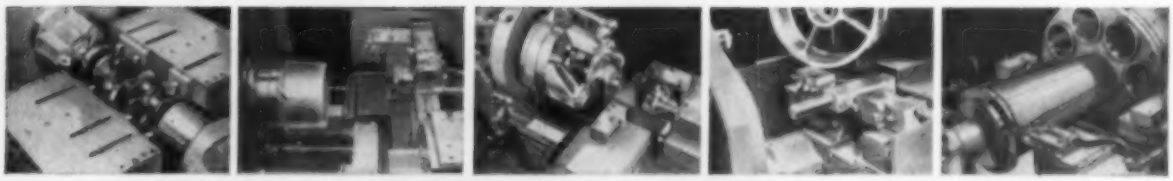
• *Our information came from a U. S. Department of Commerce book,* "Investigation of the Bonding of Silicone Carbide by Metals" *(PB111415). To obtain it, write the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.*

Giant Strides

May we have 10,000 reprints of your story, "A Giant in One Generation" (March 7, page 110)? Personally, I have long considered STEEL as one of the finest looking publications I have read.

Gene Drossel
Press Relations
Kaiser Steel Corp.
Oakland, Calif.

• *Being sent.—ED.*



All these different tooling setups

show the amazing versatility

of this fully automatic lathe

...the SIMPLIMATIC

Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price.*

If you have medium or long runs on parts up to 33½" in diameter, get the facts about the Simplimatic Automatic Lathe.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.

Gisholt Machine Co.
Madison 10, Wisconsin
Gentlemen:
Please send my copy of the Simplimatic Catalog.

Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....

Gas heater by Temco, Inc., Nashville, Tenn.

Expanded metal grille *DELIVERS HEAT*

ENHANCES STYLE in new "cool cabinet" heaters

Above is one in a line of famous heaters, recently redesigned for maximum heating efficiency, and to bring modern styling to the gas heating field. Says the manufacturer, "The styling of the new heaters is enhanced by a 'television-screen' grille of expanded metal."

The two Penmetal expanded metal grilles have a double function. Besides being harmonious with modern home furnishings, they permit the free passage of heat. This heater combines the advantages of radiant and circulating heaters, to give faster heat distribution.

Penmetal expanded metal is sheet metal slit and expanded to as much as ten times its original width. Up to 80% lighter than solid sheet of the same dimensions, the diamond truss pattern adds rigidity and strength yet permits the passage of light, heat and sound. Available in carbon steel, aluminum, stainless steel, Monel, Inconel and other metals; large or small mesh; light or heavy gauge.

Perhaps you, too, can make a better product with Penmetal expanded metal. Send for 28-page catalog giving mesh sizes, weights and dimensions and suggested uses for this versatile material.

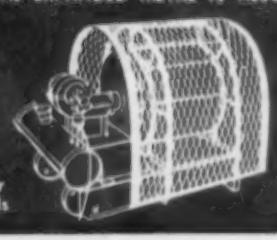
PENN METAL COMPANY, INC.

General Sales Office: 205 East 42nd Street, New York 17, N. Y.
Plant: Parkersburg, W. Va.

Penmetal

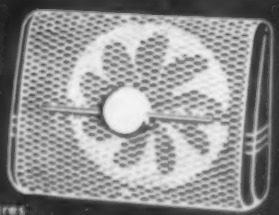
PM-64

PENMETAL EXPANDED METAL IS ALSO USED FOR:



Heater Guards

Air Conditioning Unit Grilles

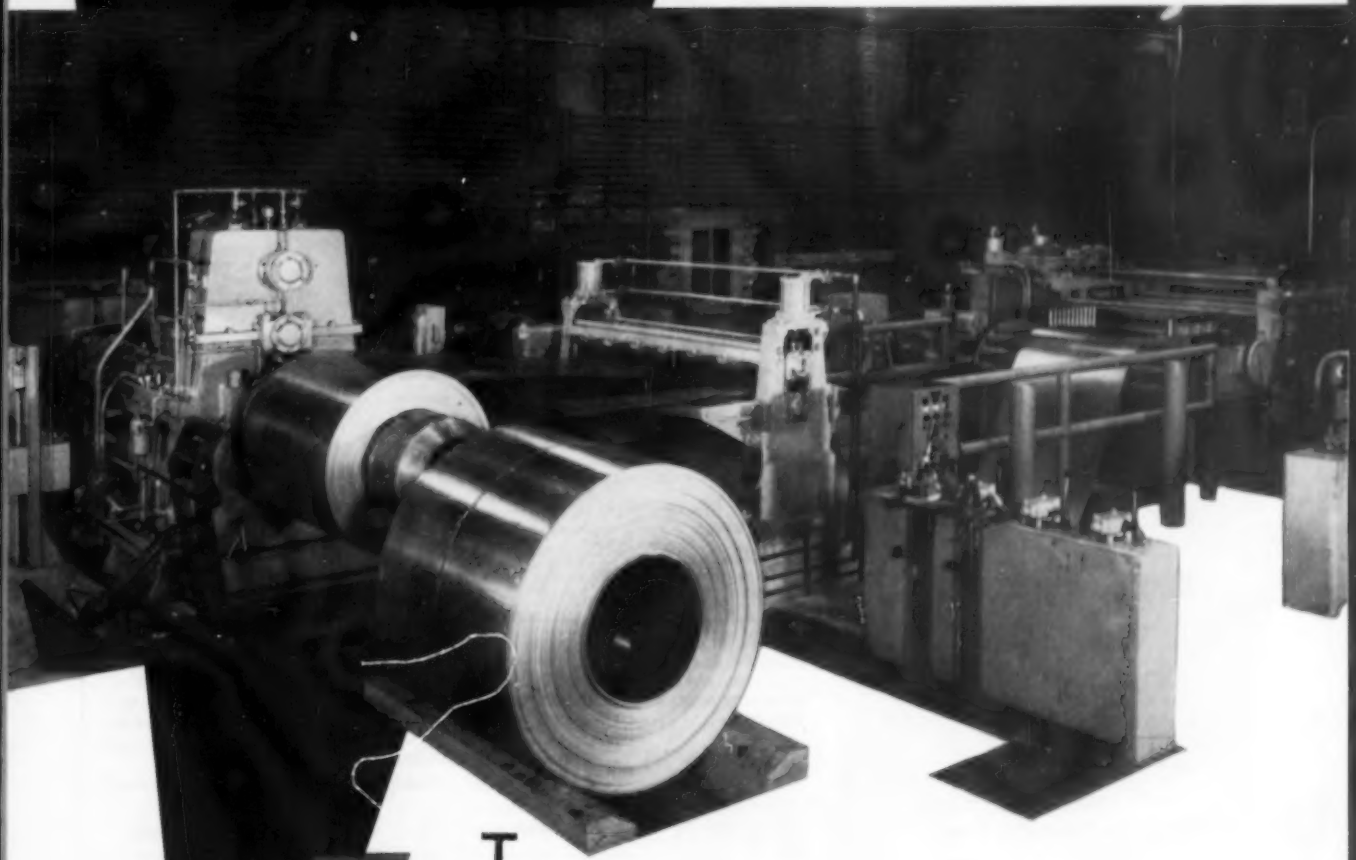


Fan Enclosures

The WEAN

Engineering Company Inc.

Warren, Ohio . .



THE Wean Engineering Company, Inc., Warren, Ohio, is a recognized specialist in the design and installation of sheet, tin and strip mill equipment. The expert knowledge and trained imagination of one of the world's most noted steel mill engineering firms is at your service when you specify Wean — whether the job calls for a single piece of equipment or a complete design of an entire line.

SPECIALISTS IN SHEET, TIN & STRIP MILL EQUIPMENT

Coming May 16 IN STEEL

Executive—Saving Time: How To Communicate Better

In the fourth in STEEL's ten-part Program for Management for 1955, the editors explore metalworking's communication problems. An executive conference can easily cost $360 an hour in salaries alone. How can conferences, telephone conversations, memos be better handled? A few simple principles and methods cut the time, improve the results.

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On the back of each color TV viewing screen are more than one million phosphor dots (19" screen) grouped in uniform patterns of red, green and blue. Electron beams registered with each dot are shot at these phosphors—the intensity determining the dominating color.
Directly behind the screen in each tube is a Cupro Nickel shadow mask containing more than 400,000 holes. Each hole is registered exactly with its group of phosphor dots on the screen and with the electron beam—the mask controls the register of color—keeps the image sharp —the color true.

Color TV came to ANACONDA

When the television industry needed a shadow mask to control electron beams in the color tube, Buckbee Mears Company, photoengravers of St. Paul, Minnesota, produced it. When they needed thin strip metal in which 2500 perfect holes per square inch could be etched, Anaconda produced it.

When color TV came to Anaconda, we developed a new alloy, 6% Cupro Nickel, with such uniform quality, structure and thickness (0.0075") that the microscopic holes could be etched without flaw. The new alloy also has the strength and malleability to take forming without distortion of the dot structure, and functions in a color tube without contaminating the vacuum.

Again, a copper alloy has solved a difficult problem. Perhaps yours can be made easier through Anaconda research and development. The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Limited, New Toronto, Ontario.

1

2

3

4

1 Rolls of the Cupro Nickel strip entering coating machine to be sensitized for photographic printing.

2 Camera printing dot pattern on the sensitized Cupro Nickel strip.

3 Printed Cupro Nickel strip at right entering etching machine where acid baths plus washing and rinsing operations produce finished mask.

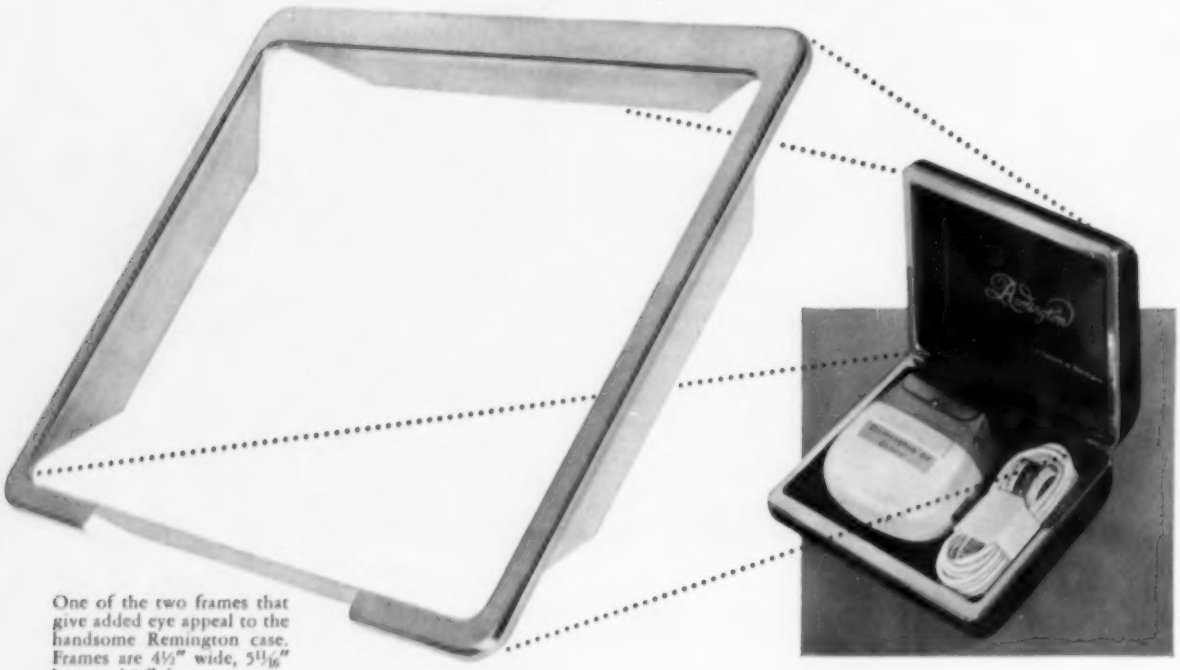
4 Each 19" shadow mask has more than 400,000 holes, size .010±.0005. Several areas of screen are inspected electronically to check hole size.

ANACONDA the name to remember in

COPPER • BRASS • BRONZE

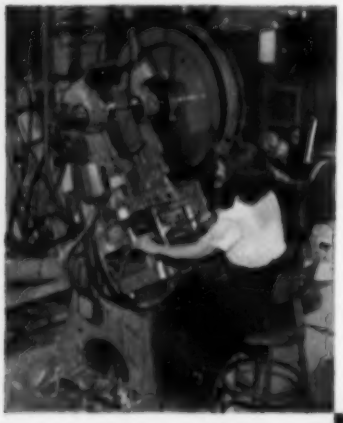
Rejects dropped from 11% to 1%

when Farrington switched to Formbrite for frames of Remington Shaver case



One of the two frames that give added eye appeal to the handsome Remington case. Frames are 4½" wide, 5 11/16" long and ½" deep.

Formbrite* fine-grain drawing brass is harder, stronger, springier...often polishes in half the time



Press operator blanks frames for the Remington case out of 6" x .0126" Formbrite drawing brass strip.

Each day, thousands of these brass frames for the Remington-60 Deluxe Shaver case are made by Farrington Manufacturing Company of Boston. Using ordinary brass, rejects *after polishing* were running at the rate of 11%.

Then Farrington switched to Formbrite. Rejects dropped immediately to less than 1% . . . and with far less polishing Farrington now gets the best finish they've ever seen. And that's important because the Remington case helps sell the shaver.

You'll find Formbrite surprisingly ductile . . . it's readily stamped, formed, drawn and embossed. Yet with all its advantages, it costs no more than ordinary drawing brass. We'd like you to know this cost-saving metal better. May we send you descriptive literature (ask for booklet B-39)? A free sample to try in your own shop? Or have a representative call? Simply write to *The American Brass Company, General Offices, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ontario.*

*Reg. U. S. Pat. Off

5577

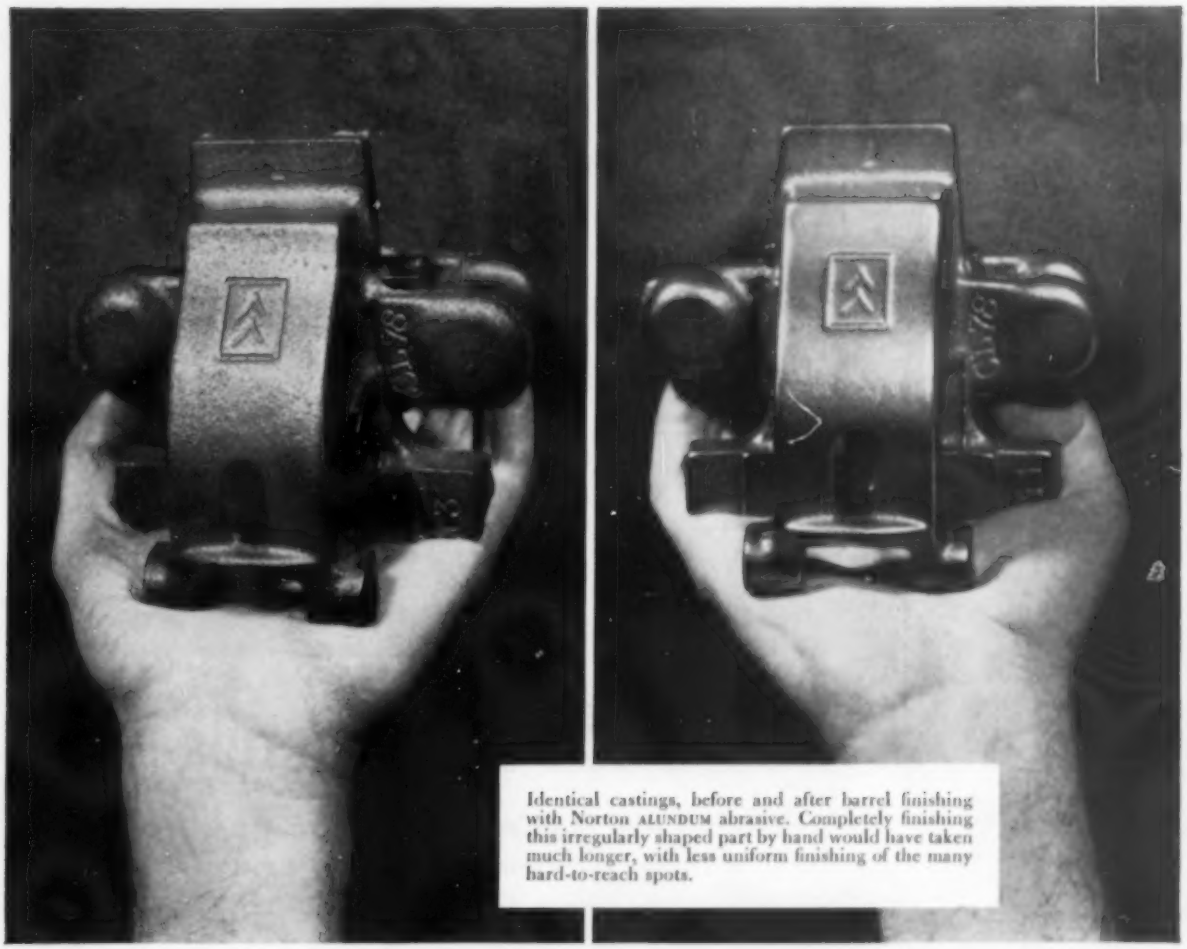
Frames are set in fixture for finishing operation on this automatic, three-station polishing machine. Bright, lustrous finish is obtained in one pass through the machine.

Formbrite

FINE-GRAIN DRAWING BRASS

AN ANACONDA® PRODUCT

made by The American Brass Company



Identical castings, before and after barrel finishing with Norton ALUNDUM abrasive. Completely finishing this irregularly shaped part by hand would have taken much longer, with less uniform finishing of the many hard-to-reach spots.

ALUNDUM* tumbling abrasive tames another tough one!

Intricate parts finished faster, more thoroughly, when Norton abrasive adds the "TOUCH of GOLD"

The trickier, more intricate the parts, the easier it is to see the many advantages of barrel finishing with ALUNDUM tumbling abrasive. Hand finishing the casting illustrated, for example, would have been a long, tiresome chore — and an uneven job at best, due to the many irregularities of shape.

For parts ranging from even heftier castings down to tiny needles, there's nothing like ALUNDUM abrasive to bring out *all* the benefits of barrel finishing. This typical Norton abrasive development is sharp, dense, hard and non-fracturing. Its blocky shape eliminates slivers and chips in the tumbling process. In your tumbling barrels it assures:

- *Highest uniformity of radii and surfaces, with brightest, smoothest finish.*
- *Continual savings of man-hours, by reducing tumbling cycles, scrap and reworking to minimum.*

See Your Norton Distributor

for further facts on how ALUNDUM abrasive can add the time-saving, profit-boosting "Touch of Gold" to your finishing operations. Ask him for the new 55-page booklet on barrel finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. 6281

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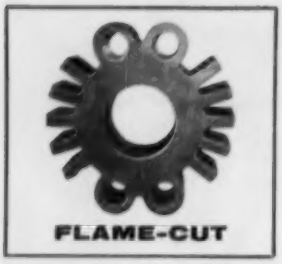
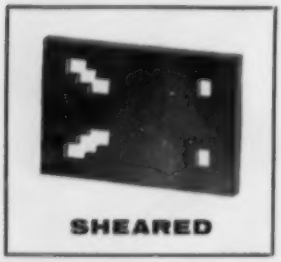


FLAME-CUT



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If you're searching for ways to pare production costs, look at pre-formed parts. Savings of 5% to 25% are possible when you buy components already shaped from rolled carbon, alloy or clad steel plate.

With By-Products Steel Co.'s Steel Plate Shapes Service, you pay freight only on material you will use. Plate inventories can be reduced and scrap problems virtually eliminated, saving both dollars and space.

Equipment builders find consistent savings right down the line with pre-formed parts. A wide range of finishes, from as-formed to finish-machined, saves production steps. No costly patterns are needed; Steel Plate Shapes Service works directly from blueprints. Over 150 major machines are available to flame-cut, shear, bend, blank or press your parts.

Located next to the mills of the world's leading producer of specialty steel plate, we can work from plates up to 195" wide or 25" thick, form and heat treat them to your specifications. If you wish to find out how you can use this unique service to cut your production costs, write on your letterhead for Bulletin 712. Address: By-Products Steel Company, 742 Strode Avenue, Coatesville, Pennsylvania.

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Simonds 24 x 2½ x 12 wheel with Reinforcing Flanges

PERFORMANCE

Good cutting action: no dressing needed. Gave 1/3 to 1/2 longer life than competitive wheels.

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SNAGGING WHEELS

WITH REINFORCING FLANGES

These wheels head into work with real productive bite. Patented Reinforcing Flanges prevent radial cracks . . . add extra safety for the stress of your toughest grinding jobs. Write for bulletin ESA 62.

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Small Fry... Big Business

Another example of how Carpenter ***Application Engineering Service*** *is helping industry cut costs, build sales.*

Mention cowboys and Indians to kids from 3 to 13 and their eyes light up, cap pistols start barking, and the fun is on. The game hasn't changed much or lost its excitement since we were small fry . . . but today it spells big business.

And making novelties like this decorative piece for belts and holsters in multi-million quantities, calls for a fine sense of production know-how and cost control. In this case, the Company wanted to hold down costs by cold forming the impressions in the dies, rather than machining them. This called for a special kind of die steel . . . one that would "take" the master form or hob but would still stand up in the presses under long, punishing runs.

Again, Carpenter was called in, and **A**pplication **E**ngineering **S**ervice went to work. Super Samson, a new steel developed in Carpenter laboratories for just such jobs, was recommended and used. Now the Company reports that Super Samson has saved considerable money in the *making* of the dies . . . and the Super Samson dies are turning out the novelties in big, profitable quantities.

Time and again, industry is finding new ways to save money and improve product sales with the help of Carpenter **A**pplication **E**ngineering **S**ervice . . . a service backed by almost 70 years of leadership in specialty steel development . . . a service that uses imagination to help your shopmen apply steels for best results. **A. E. S.** is yours to profit by when you do business with Carpenter. THE CARPENTER STEEL COMPANY, 139 W. Bern St., Reading, Pa.

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Pioneering in Improved Tool, Alloy and Stainless Steels Through Continuing Research

JUMBO COILS

from a BLISS WELD-A-MATIC SPLICER

mean . . . longer mill runs . . . less handling time

High-speed end to end welding of ferrous and non-ferrous strip on this Weld-A-Matic Splicer builds up coils to larger sizes, greater weights. And automatic, rapid coil build-up means practically continuous mill operation . . . longer mill runs . . . less handling time.

The Splicer butt welds brass or copper strip, low, medium and high carbon strip, chrome and nickel-chrome stainless strip, silicon strip and several grades of aluminum—using the shielded arc principle. The weld itself is clean, ductile, and as strong as the metal itself. No trimming is required on the weld before it enters strip-processing machinery.

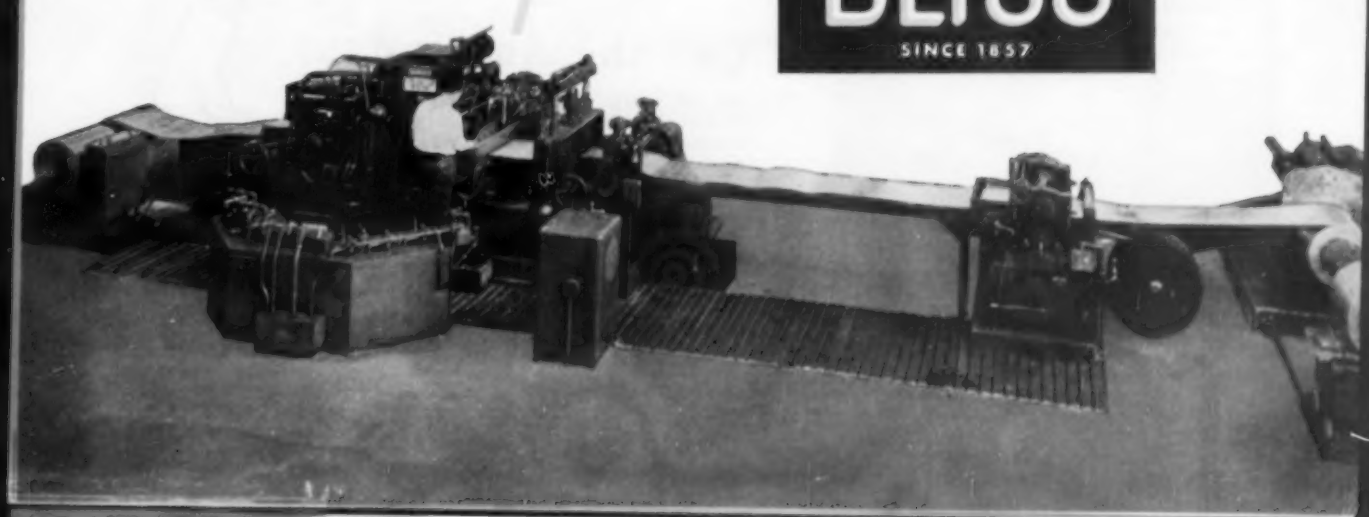
These completely integrated machines combine shears, clamps and welders—all the parts necessary to prepare and weld strip for building up coils to larger sizes . . . to reunite silicon sheets into continuous strands and coils following special processing . . . and to weld strip or skelp end-to-end for continuous feeding into production lines.

Gages spliced range from 0.014″ to 0.3125″; speeds from 25 to 120 inches per minute depending upon the gage. No special welding skills are required by operators.

For more information about Weld-A-Matic Splicers, and what they can mean to you, write or call today.

E. W. BLISS Company
General Office: Canton, Ohio
ROLLING MILL DIVISION: SALEM, OHIO

BLISS
SINCE 1857



FIRE TRAINING SCHOOL. Here at Marinette your key plant personnel will receive special training in the proper use of every type of fire equipment. They will learn the basic techniques for fighting every kind of fire. This is the best equipped private fire training school in the nation.

There is no need to accept less than Ansul's complete fire protection program!

TRAINING DEMONSTRATIONS. Our fire fighting experts provide training in the use of Ansul equipment at your plant.

ALL ANSUL EQUIPMENT is backed by a five year warranty, your assurance of fast, effective fire protection.

Experience can be a grim teacher. It has taught many a businessman that you need a *complete* fire protection program to guard against ruinous fire damage. You need *fast, effective equipment*, plus *trained personnel* to man that equipment. Ansul offers *both* and at no extra cost. Get in touch with the Ansul man, he has the story about *complete* fire protection.

Call the Ansul Man!

Get in touch with your local Ansul man through the "yellow pages" or write ANSUL CHEMICAL COMPANY, Dept. F-132, Fire Equipment Division, Marinette, Wisc. Write Ansul for your copy of new Fire Equipment Catalog.

ANSUL

CALENDAR
OF MEETINGS

Apr. 18-19, American Institute of Steel Construction: Annual national engineering conference, Muehlebach hotel, Kansas City, Mo. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. A. Post.

Apr. 18-20, American Management Association: Packaging conference, Palmer House, Chicago. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Apr. 18-20, American Institute of Mining & Metallurgical Engineers: National open hearth conference, Bellevue-Stratford hotel, Philadelphia. Institute's address: 29 W. 39th St., New York 18, N. Y.

Apr. 18-20, National Air Pollution Symposium: Huntington-Sheraton hotel, Pasadena, Calif. Information: Stanford Research Institute, Stanford, Calif. Chairman: Dr. A. M. Zarem.

Apr. 18-20, Triple Industrial Supply Convention: Cleveland Public Auditorium, Cleveland. Information: Hunter - Thomas Associates, Keith Bldg., Cleveland 15, O.

Apr. 18-21, American Society of Mechanical Engineers: Spring meeting, Lord Baltimore hotel, Baltimore. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 18-21, Society of Automotive Engineers Inc.: Aeronautic meeting, production forum and aircraft engineering display, Statler and McAlpin hotels, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Apr. 19-20, Material Handling Institute Inc.: Spring meeting, Edgewater Beach hotel, Chicago. Institute's address: 813 Clark Bldg., Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

Apr. 24-28, Scientific Apparatus Makers Association: Annual meeting, the Greenbrier, White Sulphur Springs, W. Va. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Apr. 24-28, American Ceramic Society: Annual meeting, Netherland Plaza hotel, Cincinnati. Society's address: 4055 N. High St., Columbus, O. Secretary: Charles S. Pearce.

Apr. 25-27, Association of Iron & Steel Engineers: Annual spring conference, Hotel Statler, Detroit. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 27-29, Grinding Wheel Institute and Abrasive Grain Association: Spring meeting, the Homestead, Hot Springs, Va. Information: Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland 15, O.

Apr. 27-29, Society for Experimental Stress Analysis: Spring meeting, Hotel Statler, Los Angeles. Society's address: P.O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

Apr. 27-29, Rail Steel Bar Association: Annual meeting, Grand hotel, Point Clear, Ala. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 28-29, American Zinc Institute Inc.: Annual meeting, Drake hotel, Chicago. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive vice president-secretary: Ernest V. Gent.

Apr. 28-30, Lead Industries Association: Annual meeting, Drake hotel, Chicago. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

May 1-4, Liquefied Petroleum Gas Association Inc.: Annual meeting and exhibit, Conrad Hilton hotel, Chicago. Association's address: 11 S. LaSalle St., Chicago 3, Ill. Secretary: Arthur C. Kreutzer.

May 1-4, National Metal Trades Association: Western plant management conference, French Lick Springs hotel, French Lick, Ind. Association's address: 122 S. Michigan Ave., Chicago 3, Ill. Secretary: Charles L. Blatchford.

— with hand tools on the job or in the shop?

Porter hand power cutters cut up to and including

- 3/4" bolts — hard or soft
- 3/4" chain
- 5/8" rod
- 3/4" wire rope

as well as steel strapping, insulated cable, spring wire, etc.

SEND for this book which shows materials to be cut and cost comparisons between cutting methods. It may save you money.

H. K. PORTER, INC.
Somerville 43, Mass.

Please send me my copy of "CUTTING METALS THE EASY WAY".

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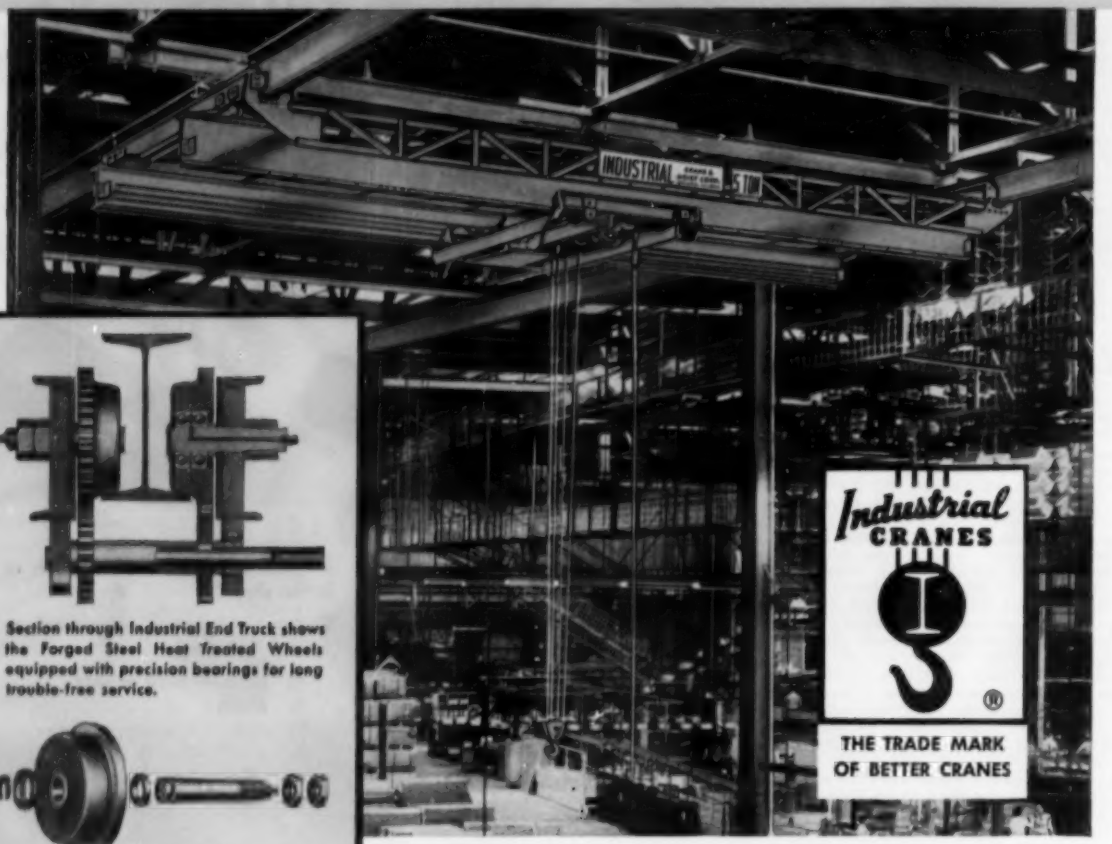
MY DISTRIBUTOR IS

Industrial UNDERHUNG Motor Driven CRANES

are the Best Cranes for the Long Run



Section through Industrial End Truck shows the Forged Steel Heat Treated Wheels equipped with precision bearings for long trouble-free service.

The Patented Industrial Removable Axle enables a wheel change (if ever necessary) to be made in minutes without dismantling the crane or removing it from the runway.

Industrial End Trucks are Jig Assembled and Jig Bored for perfect alignment of all wheels, axles and drive shafts.

The best Crane Values because Industrial Cranes are quality engineered and ruggedly built for longest service. No other crane in its field has so many outstanding features. Every Industrial Underhung Motor Driven Crane has the following standard equipment:

- FORGED STEEL HEAT TREATED WHEELS
- PATENTED INDUSTRIAL REMOVABLE AXLES
- JIG ASSEMBLED, JIG BORED ALL WELDED END TRUCKS
- BALL AND ROLLER BEARINGS THROUGHOUT
- GEAR DRIVE OPERATING IN OIL BATH

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INDUSTRIAL CRANE & HOIST CORPORATION

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Overhead Cranes • Jib Cranes • Monorail Systems • Crane Runways

Representatives in Principal Cities

How many push-ups in a STAINLESS TUBE?

Courtesy: American District Steam Co., Inc.

The service life of this corrugated element depends on its ability to do push-ups.

Hydraulically formed from a welded stainless steel tube, it's a vital part in a Corruflex pipe expansion joint. In operation it absorbs the motion that results from pipe expansion and contraction. Often used in inaccessible locations, it's produced to rigid standards to eliminate shutdowns . . . loss of manhours . . . and maintenance costs.

In a recent durability test (see photo) the joint was subjected to 22,000 push-ups . . . 22,000 complete cycles of extension and compression —without failing. Flexing was stopped only because requirements had been met. Trouble-free tubing for this grueling application is regularly furnished by Frasse — in stainless types 304, 316 and 347—in sizes from 4¼" O.D. up to 54¾" O.D. !

Frasse specializes in furnishing *quality* tubing for exacting applications — and stocks in conveniently located warehouses a complete range of sizes in carbon, alloy and stainless analyses for you to work with. And, equally important, Frasse engineers will gladly work with you in determining the right size and grade needed to do the job. When you need tubing or tubing guidance—*always call Frasse.*

FRASSE

for everything in Steel Tubing

If you use tubing . . .

Send for this new folder describing *all* Frasse tubular products. Details include analyses, size ranges, mechanical and physical properties—also fabricating hints and ideas for end uses. Frasse tubing "specials" are included too! Mail the coupon for your copy—it's free!

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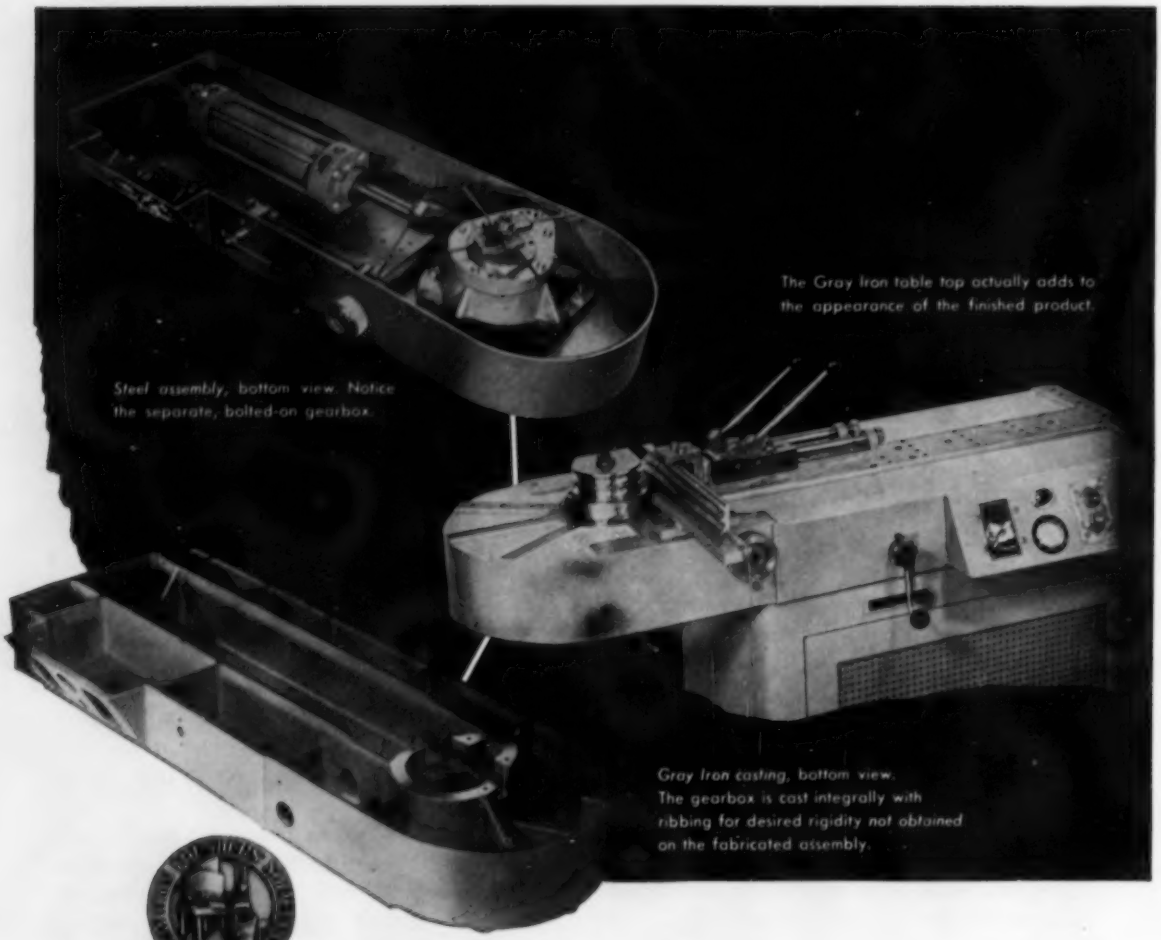

The Gray Iron table top actually adds to the appearance of the finished product.
Steel assembly, bottom view. Notice the separate, bolted-on gearbox.
Gray Iron casting, bottom view. The gearbox is cast integrally with ribbing for desired rigidity not obtained on the fabricated assembly.

This symbol assures you the most for your casting dollar

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

MAKE IT BETTER WITH GRAY IRON

15 Hours Saved
...by Casting in Gray Iron

Producing these machine table tops in Gray Iron takes 7½ hours. Previously, the tops were fabricated of torch-cut steel segments, requiring 22¾ hours.

Redesigning in Gray Iron has increased the rigidity of the table tops, improved their appearance and simplified production operations.

There are many valuable advantages which Gray Iron castings can offer *you*. Call your nearest Society member foundry and through him the full facilities of this association are available to help you.

Or, write direct to Gray Iron Founders' Society, Inc., National City-E. 6th Bldg., Cleveland 14, Ohio, for helpful technical and business information.

GRAY IRON FOUNDERS' SOCIETY

7 benefits received by switch to STANOSTAMP *Compound C*

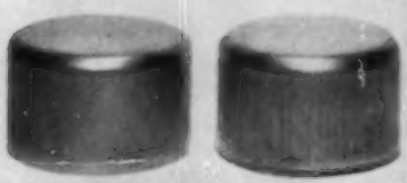
Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard Oil lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

The results add up to this: There is a combination in the field of industrial lubrication that is hard to beat. It is (1) Standard Oil lubrication specialists capable of giving technical help and (2) Top quality products *that deliver results.*

STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work produced using STANOSTAMP.

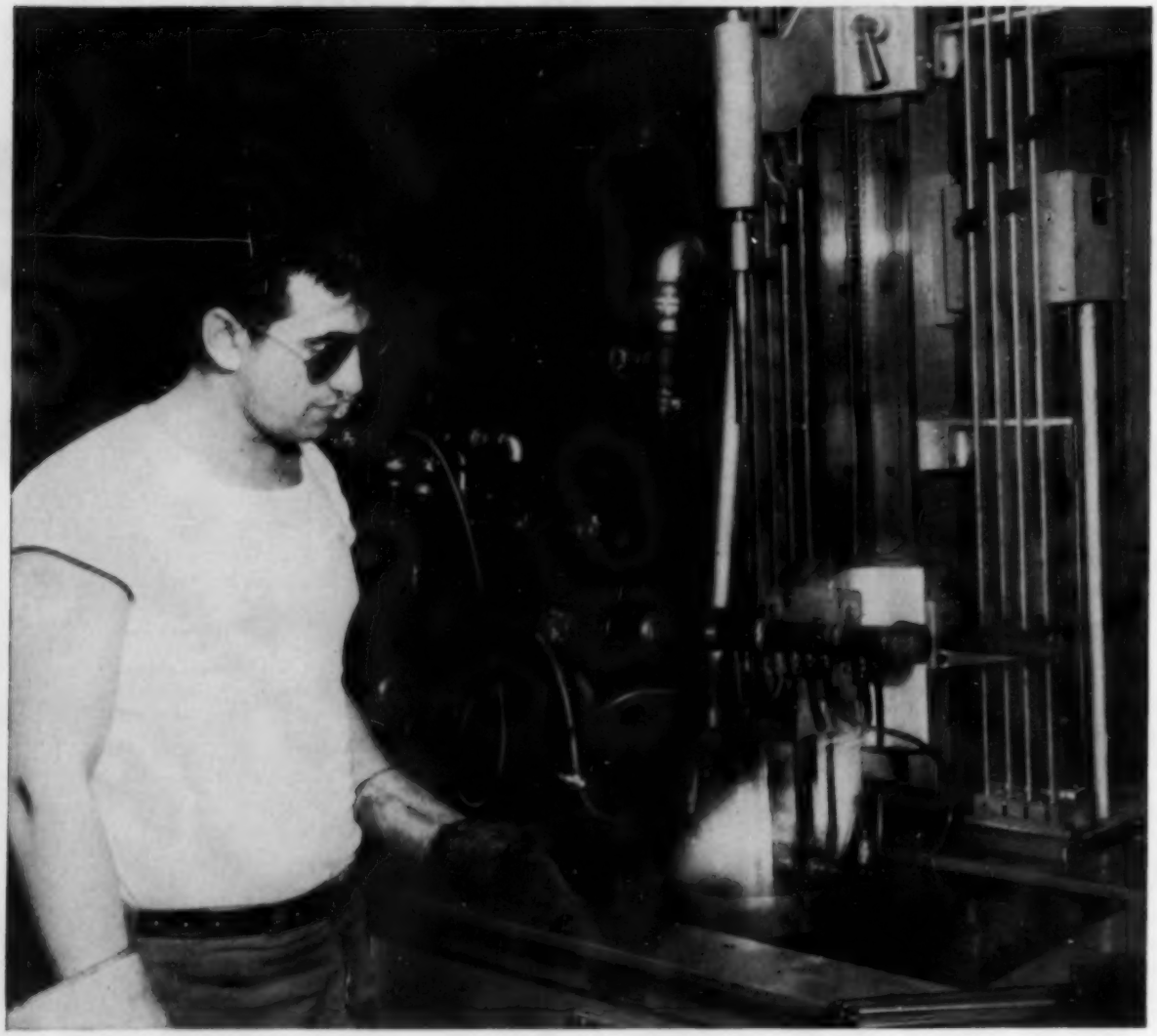


Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this forming compound. Scoring of dies as well as work occurred before switch.

STANDARD OIL COMPANY
(Indiana)

STANDARD

(Advertisement)



GAS— an adaptable tool for L R Heat Treating Co.

This is one of the many applications of Gas for special heat treating problems at L R Heat Treating Co., Newark, New Jersey. In this case, metal to be heat treated is held stationary while Gas burners move vertically along the length of the work. Sprays of water just below the flame area do the quenching.

Gas is the fuel used for heat treating at this modern plant. When asked to give their reasons for preferring Gas for heat treating, the staff at L R Heat Treating selected the following points as most important:

1. Very clean
2. Easy to control
3. Better combustion
4. Less equipment maintenance
5. No messy leaking connections
6. Easier to start up after shut-down
7. Dependable fuel supply
8. Excellent technical service supplied by the local utility

For further information on how Gas can help you in your heat treating operations, call your Gas Company Industrial Specialist. He'll be glad to discuss the economies and results Gas and modern Gas-fired industrial equipment can provide. *American Gas Association.*

You can spot productive hands by the company they keep!

Boost contour polishing with Behr-Manning abrasive belts!

WITH THESE MODERN COATED ABRASIVE applications on hand, you can produce superior finishes on tricky contours at record breaking speeds. The combination of flexible, even-cutting BEHR-MANNING abrasive belts and up-to-date methods make this possible. Test them on your parts — in your plant or in a nearby BEHR-MANNING Demonstration Room.

Write for the Production Digest Bulletin. Contains 60 pages of detailed data on coated abrasive grinding and polishing techniques. Address Behr-Manning, Troy, N. Y., Dept. S-4.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
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Model CN-2 made by Engelberg-Huller Co., Syracuse, N. Y.

A favorite for dry fining and blending plumbing parts.

Smoothing the way to finer finishes on flat areas.

Tops for removing flash from difficult inside contours.

G-4

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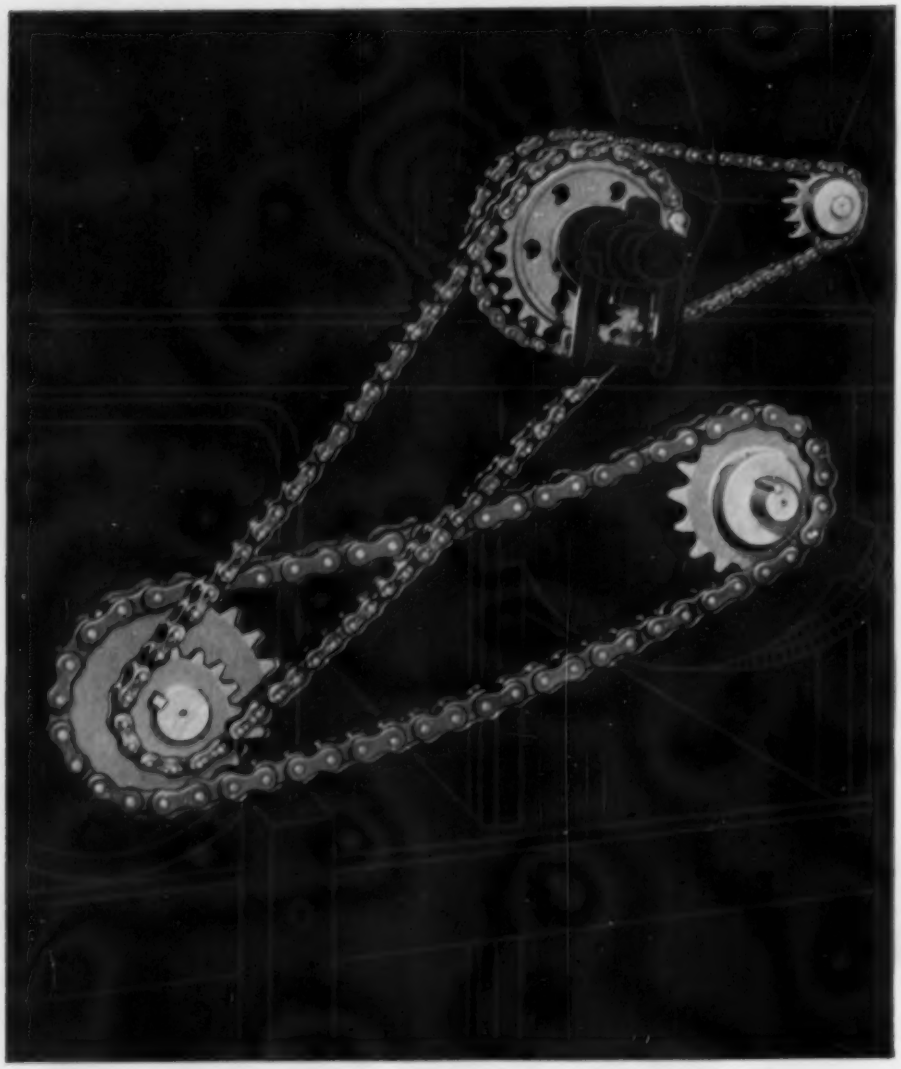
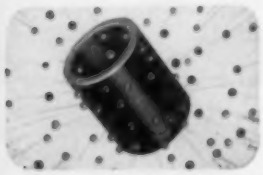
In roller chain . . . EXTRAS* like these give you extra reliability



LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

PRE-STRESSING of multiple width chain provides uniform load distribution.



SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL — coupled with rigid testing insures uniformity.

*And you pay no premium for these LINK-BELT extras

BIG reason why Link-Belt Precision Steel Roller Chain is first choice for so many tough jobs is that it has *extra reliability built-in*. For example, pre-stressing smooths out any irregularities of multiple width chain *in advance*. And it's just one of many *extras* you get as *standard* from Link-Belt. Check the three others shown here. Then call the Link-Belt office or authorized stock carrying distributor near you for facts on Link-Belt's complete range of roller chain and sprockets. Data Book 2457 gives full information on single and multiple widths, in ¼″ to 3″ pitch, 1″ to 3″ double pitch. Ask for your copy.

LINK-BELT

ROLLER CHAIN & SPROCKETS

12,702

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Stainless Steel bulb for color television tube by I-T-E Circuit Breaker Co., Philadelphia, Pa.

Spinning Stainless Steel circles into cone.

Forming cone on 500-ton hydraulic press.

How Stainless Steel helps I-T-E put color into television

Television is opening up a whole, wide wonderful world of color and Stainless Steel is playing an important part in this great advancement. I-T-E Circuit Breaker Company is manufacturing the bulb assembly for color television using cones made from Stainless Steel.

The advantages lie in the light weight made possible by metal shell construction—a highly important consideration at this stage of color tube development—the safety factor of a metal-glass tube and the ability to use a higher-quality glass in the picture surface. Stainless Steel's coefficient of thermal expansion makes it a suitable material for a metal-glass bond.

I-T-E's choice of Stainless Type 430 for its color TV development was a natural as they have produced millions of Stainless Type 430 cones for black and white picture tubes ranging from 8½" diameter sizes to 27" rectangulars.

Stainless Steel's unique combination of properties merits consideration in all types of design problems. And it's not a difficult material to fabricate. Investigate Stainless Steel for your products, and when you do, be sure to use service-tested USS Stainless Steel.

SEE The United States Steel Hour.
It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

FABRICATING FACTS

For the bulb circles of USS Stainless Steel .125" thick are used. Circles are shear formed on a spinning lathe to produce a cone 21" in diameter, tapering to 8" by 14" deep.

Cone is further formed on 500-ton press. Panel is sheared from funnel, flanges are formed and deburred and both parts sandblasted to receive glass.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · NATIONAL TUBE DIVISION, PITTSBURGH
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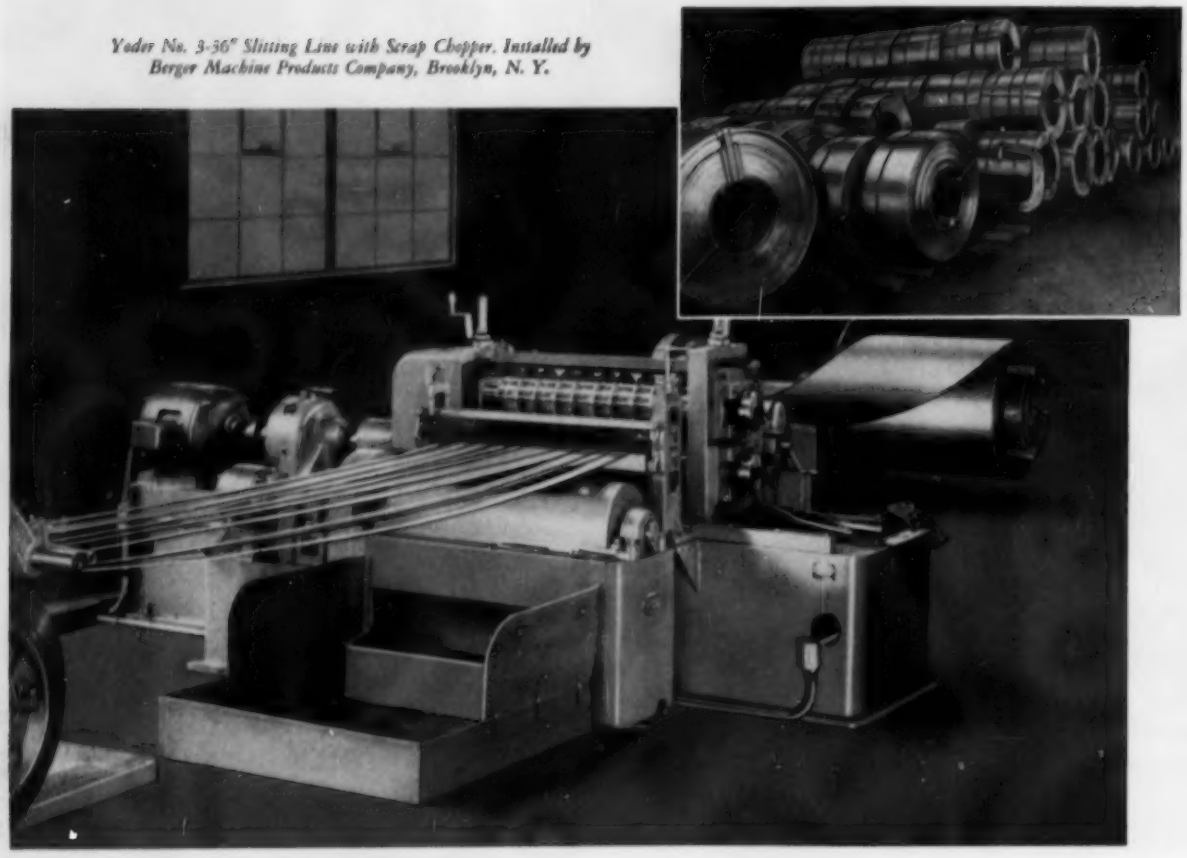
USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

Yoder No. 3-36" Slitting Line with Scrap Chopper. Installed by Berger Machine Products Company, Brooklyn, N. Y.



To Slit or not to Slit

your own strip...

In a certain strip mill, slitting big tonnages of heavy coils, a Yoder high speed slitting line for many years has been paying for itself about every three months. Such a line is, however, far too big and costly for tonnage requirements in most plants.

For metal fabricators and warehouses handling smaller coils and tonnages, Yoder offers a selection of lower cost slitters, uncoilers and recoilers, capable of handling an astonishingly wide range of coil weights, widths and gauges, at speeds sufficient to make their operation profitable on a surprisingly small volume.

The revised fourth edition of the YODER SLITTER BOOK, just off the press, contains production records, time studies and other data helpful in determining to what extent a slitter may be profitable in your plant, be your requirements small or big.

A copy is yours for the asking. Also estimates and recommendations, without cost or obligation on your part.

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Complete Production Lines

- ★ **COLD-ROLL-FORMING** and auxiliary machinery
- ★ **GANG SLITTING LINES** for Coils and Sheets
- ★ **PIPE** and **TUBE MILLS**—cold forming and welding

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IT ALL COMES DOWN to one fact... that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered; scaleless tempered; tempered and polished, blued or strawed.

You *pay* for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J

California giant Sequoias — largest of all trees.

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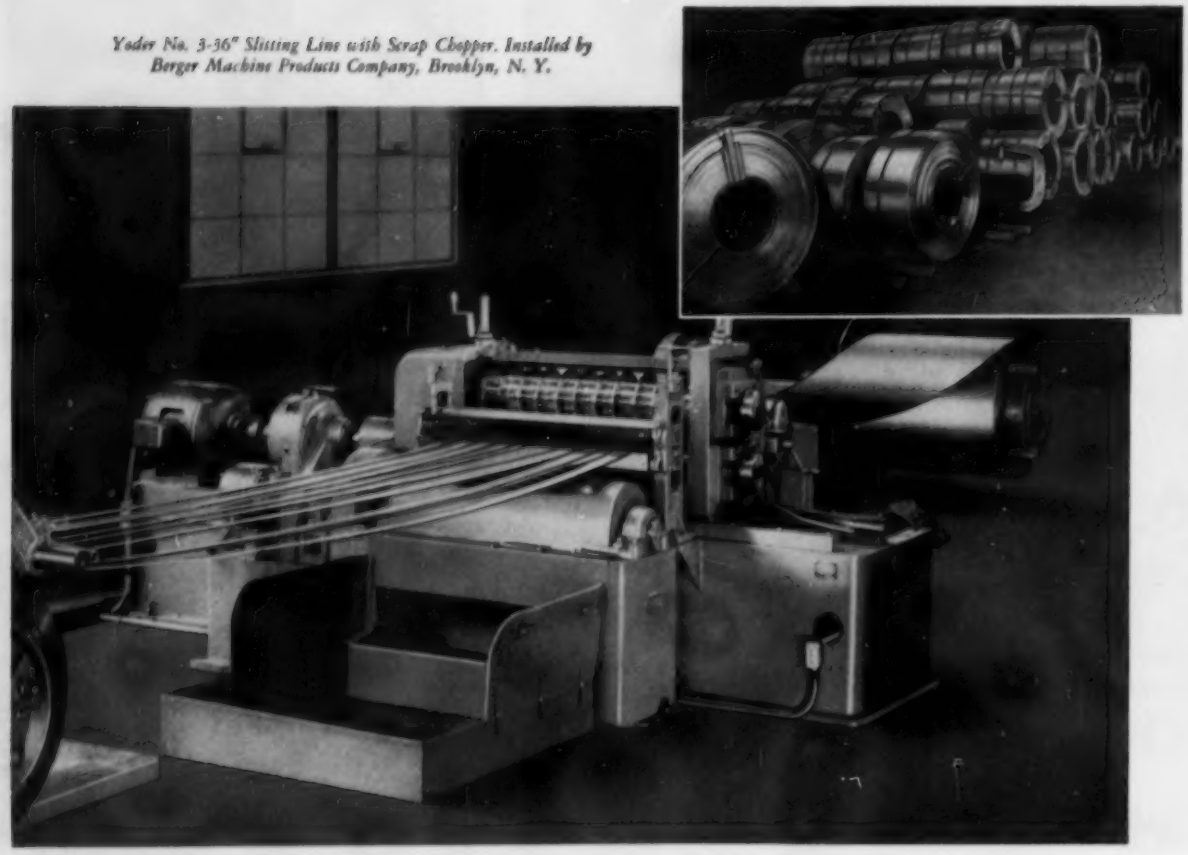
Yoder No. 3-36" Slitting Line with Scrap Chopper. Installed by Berger Machine Products Company, Brooklyn, N. Y.



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You *pay* for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J

California giant Sequoias — largest of all trees.

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Complete Facilities

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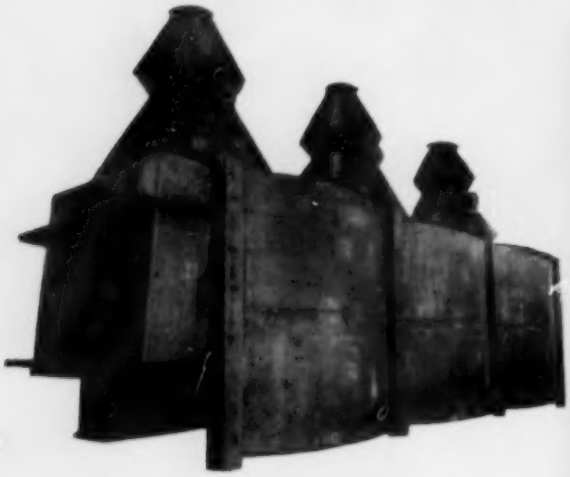
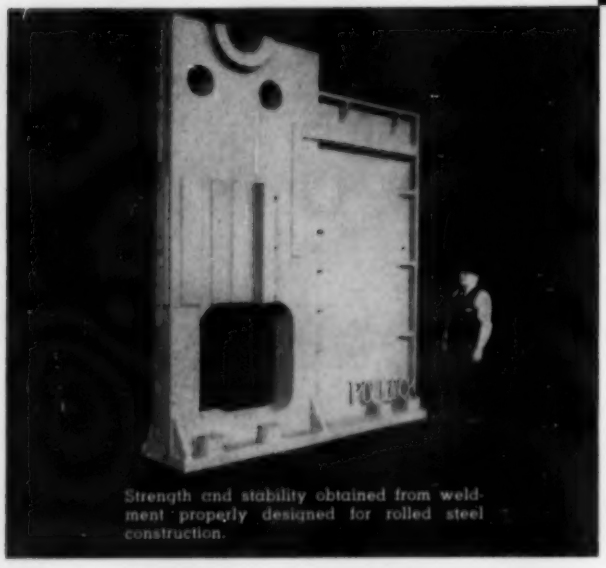
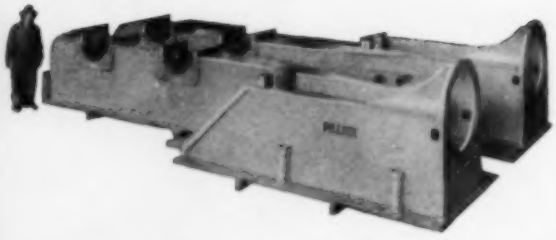


Intricate light gauge steel construction requiring precision fitting.

Complicated pipe connection including carefully fitted hi-carbon liner plates.



Strength and stability obtained from weldment properly designed for rolled steel construction.



Heavy weldment replacing steel casting, making better job and with considerable savings.

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Your steel plate work of all kinds is in safe hands at The William B. Pollock Company. Pollock methods, machines and men have served the steel industry since 1863.

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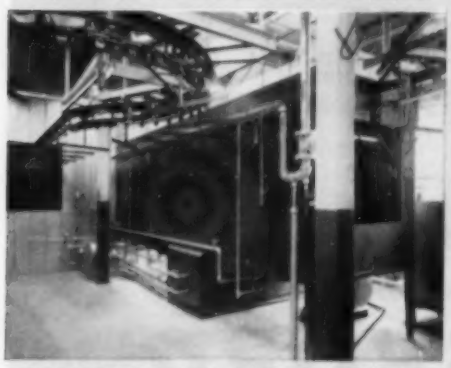
. . . for ENAMELS • LACQUER • PAINT • VARNISH

Control Station for the Complete Mahon Finishing System. All Starters and Electrical Controls are by General Electric Co.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

View inside the enclosure which houses the Complete Mahon Finishing System installed in the General Purpose Control Department of the General Electric Plant, Bloomington, Illinois.

Mahon Open-Face Hydro-Filter Spray Booth designed to meet specific painting requirements of certain products in the General Purpose Control Department of the General Electric Company.



Mahon Flow-Coater and exit end of ventilated Flash-Off Area and Drip Zone. Part of the conveyorized system at General Electric.

GENERAL ELECTRIC CONTROL ENCLOSURES are Painted in a COMPLETE MAHON FINISHING SYSTEM!

Products of the General Purpose Control Department of General Electric Company, Bloomington, Illinois, now receive their fine finish in a completely new, highly efficient Mahon Finishing System. Facilities are provided for both continuous conveyorized processing and painting of normal units and individual handling of larger units. The continuous processing system includes a Five-Stage Metal Cleaning and Rust Proofing Machine, Dry-Off Oven, Cooling Tunnel, Flow-Coater, Flash-Off and Drip Zone Enclosure, and a Finish Baking Oven. Both Ovens and the Cooling Tunnel are located overhead. In addition to the conveyorized system, a Two-Stage Metal Washing Machine was provided together with an Open-Face Hydro-Filter Spray Booth and a Batch-Type Finish Baking Oven to handle unusually large units. Other equipment includes a Filtered Air Supply System and Stripping Facilities. The entire system is modern in every respect and is engineered into a surprisingly small area of floor space. If you are contemplating new finishing equipment, you, too, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning, coordinating and engineering of equipment—which is the key to fine finishes at minimum cost. You will find also, that Mahon equipment is built better by Mahon for more economical operation over a longer period of time—a point which should receive your careful consideration when comparing initial costs. See Sweet's Plant Engineering File for information, or write for Catalog A-655.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems and Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

The CECO-DROP is setting new records -for lower costs -for higher production

The piston-lift gravity drop hammer with short stroke control

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THE HAMMER BUILDERS

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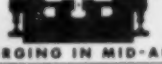
Builders of THE IMPACTER



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CHAMBERSBURG, PENNSYLVANIA

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GALVANIZED SHEETS

for long-lived roofing and siding

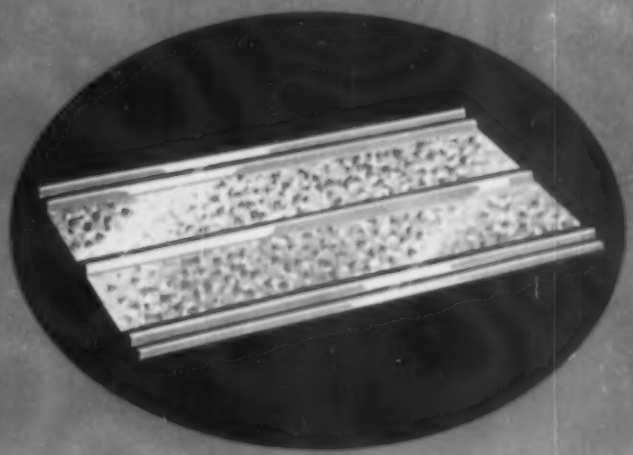
There's an easy way to solve roofing and siding problems quickly, dependably, economically. That's the Weirton way—with Weirton galvanized steel sheets. Their tight zinc coating resists cracking, peeling and flaking. The strength of steel plus the corrosion resistance of zinc gives added years of life. And long experience shows that galvanized sheets give more protection, with less maintenance and at lower cost.

Weirton's modern production processes, plus close quality control all along the line, make Weirton galvanized sheets a best buy for your roofing and siding needs.

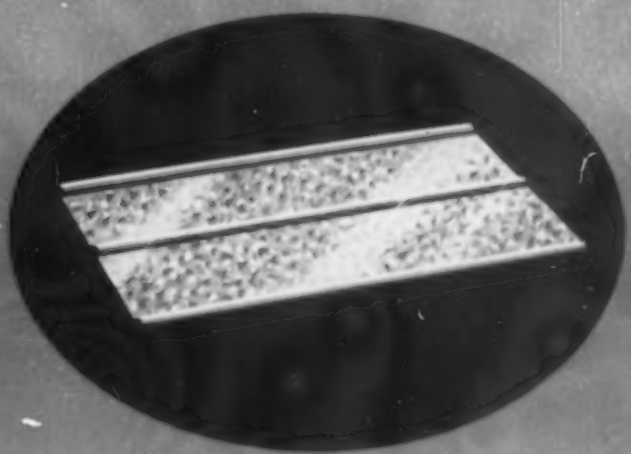
WEIRTON STEEL COMPANY

Weirton, West Virginia

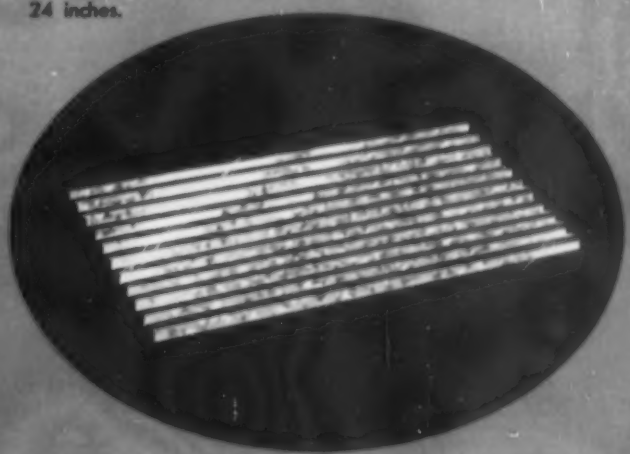
NATIONAL STEEL CORPORATION



Famous Weirton "Safety Drain" galvanized steel sheets combine maximum protection with outstanding good looks.



Weirton galvanized V-Crimp sheets are made in 2V-, 3V-, and 5V-crimped, and in gauges 26, 28 and 29; covering width, 24 inches.



Weirton galvanized corrugated steel sheets are most economical in first cost, and are the strongest form of steel roofing because the corrugations strengthen the entire sheet.

NICKEL-LUME

FOR BRIGHT NICKEL BARREL PLATING

The H-VW-M Nickel-Lume Barrel Plating Process is ideal for producing bright-from-the-barrel decorative nickel coatings on small automotive parts, jewelry, novelties, nail clippers, files, hardware, fasteners, screws, and similar items. The new process is an application of Nickel-Lume, which made its appearance a year ago as an outstanding development in a bright nickel for rack plating.

Barrel installations have been in operation in the field for some time with many enthusiastic users. An important feature of this bright-nickel barrel process, is the consistency of color maintained even in recessed areas, as in hard-to-plate threaded parts. Subsequent chromium plating can be handled with ease since the nickel deposit is very active and, unlike many bright barrel processes, is not brittle.

Advantages of Nickel-Lume Barrel Plating are:

Uniform Brightness—deposits, right out of the barrel, are uniformly bright with a pleasing "clean," white color even in hard-to-plate areas.

Low Stress—deposits are ductile and have a low compressive or tensile internal stress.

Activation Not Required—no activation is required between the nickel and chromium or other subsequent deposits.

High Tolerance To Impurities—organics are tolerated in greater concentrations than in other bright baths.

Complete Control—complete analytical control of all constituents.

Wide Operating Range—current density and temperature have a wide range with no resultant loss of brightness.

Good Corrosion Resistance—nature of the addition agent plus constant deposit characteristics give a high level of protection to the plated surface.

Stability—not a "fussy" bath—remarkably stable over long periods of operation.

Nickel-Lume for Barrel Plating is the direct result of continuous research conducted at H-VW-M . . . another example of Platemanship in action. Complete details and a new instruction manual will be forwarded on request.

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing — of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING CO. • MATAWAN, N. J.

Plants: Matawan, N. J. • Grand Rapids, Mich.

SALES OFFICES: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Boston Bridgeport • Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Los Angeles • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield • Rochester St. Louis • San Francisco • Springfield (Mass.) • Utica Wallingford (Conn.)

H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

CROSSING THE WALLKILL at New Paltz, N.Y. are the new and the old in U.S. bridge-building. Foreground: N.Y. State Thruway bridge erected by Phoenix Bridge Co. is 356 ft. long, 107 ft. wide, weighs 1778 tons. In distance is Perrine's Bridge built in 1850.

Three-handed bridge

The sign on this New York Thruway bridge says "Phoenix"—but the structure is actually the product of three Barium companies.

Steel plate came from Central Iron and Steel Company; structural members from Phoenix Iron & Steel Company; while fabrication and erection were done by Phoenix Bridge Company, live-wire veteran of 91 years in the bridge-building business. Tie that for a smooth-running, integrated operation.

Bridge-building is only one field where Barium delivers the goods faster. Reason? We can focus the resources of 16 separate companies on the job. And there aren't many jobs the Barium team isn't able to take on. Reason for *that*? Unique diversification—from asphalt barges to magnesium airplanes—plus an alert management intent on keeping Barium a step ahead of the field.

Your copy of the Barium Story, which goes behind the scenes at Barium, is waiting. Just write Barium Steel Corporation, 25 Broad St., New York 4, N.Y. 53

16 INTEGRATED COMPANIES

BARIUM

STEEL CORPORATION

WORKING IN STEEL, ALUMINUM, MAGNESIUM, FIBERGLASS

Steel Producers

Chester Blast Furnace (pig iron) • Central Iron and Steel Company • Phoenix Iron & Steel Co.

Steel Fabricators & Processors

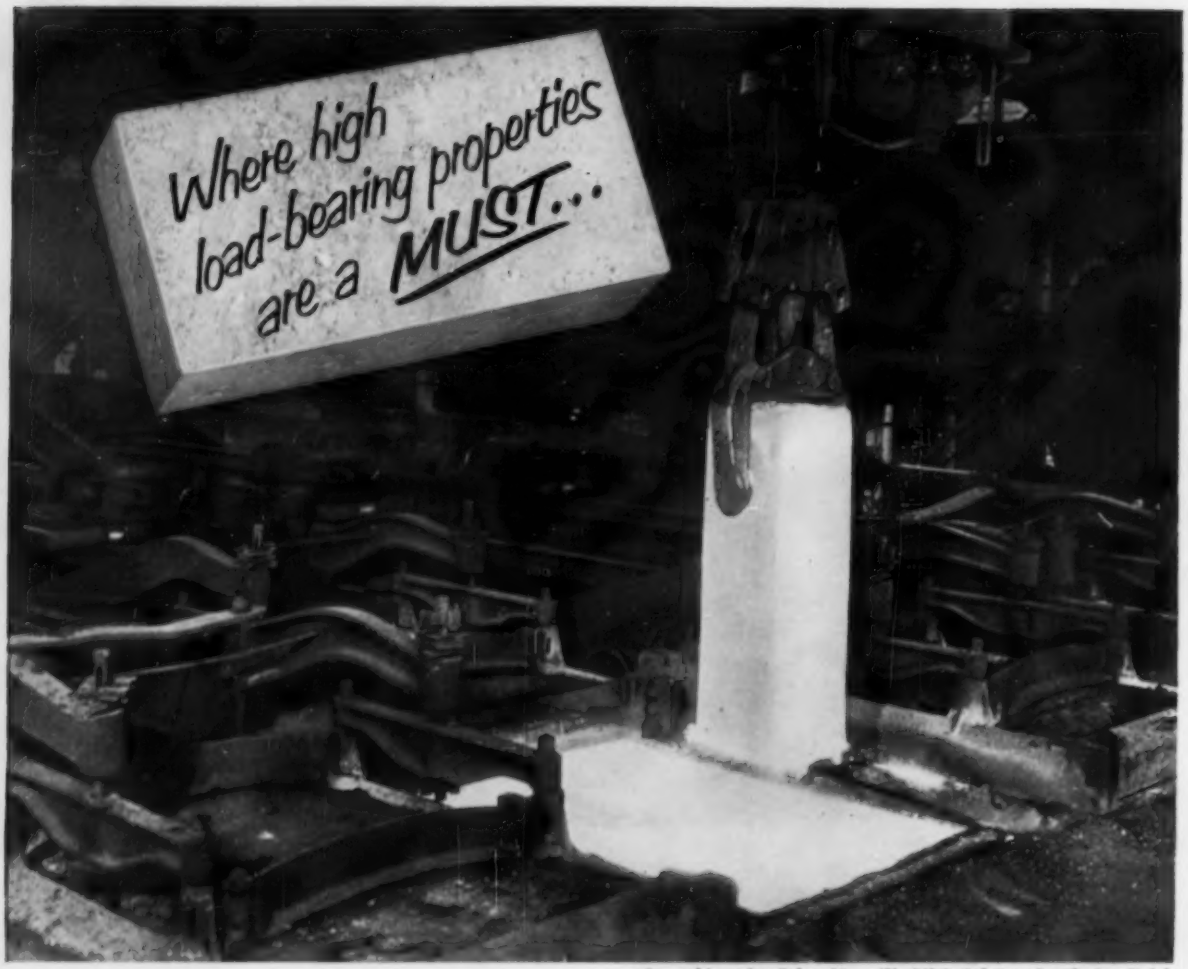
Phoenix Bridge Co. • Industrial Forge & Steel, Inc. • Globe Forge, Incorporated • Geometric Stamping Co.

Manufacturers of End Products

Clyde Iron Works, Inc. • Erie Bolt and Nut Company • Bayonne Bolt Corp. • Cuyahoga Spring Company • Jacobs Aircraft Engine Co. • Kermath Manufacturing Company • Kermath Limited (Canada) • Wiley Manufacturing Co.

Lightweight Metal and Plastics

East Coast Aeronautics, Inc.



In soaking pits, Johns-Manville Sil-O-Cel C-22 Insulating Brick provide outstanding performance as back-up insulation.

Specify

Johns-Manville SIL-O-CEL C-22 Insulating Brick

the diatomaceous silica brick that retains its high cold crushing strength of 700 psi throughout normal service range

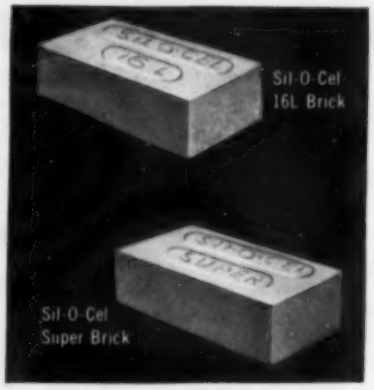
Because of its exceptional strength Sil-O-Cel C-22 Insulating Brick has gained wide acceptance as an all-purpose insulating brick. It is especially recommended for soaking pits, open hearth bottoms, slab heating furnaces, hot blast stoves, coke ovens and other high temperature equipment.

Millions of microscopic cells provide Sil-O-Cel C-22 brick with excellent heat resistance up to 2000F. It has a thermal conductivity of only 1.88 Btu in/sq ft/F/hr at 1000F mean temperature. In addition, with a density of 38 lb/cu ft, it is light and easy to handle.

For direct exposure or back-up to 1600F, use Sil-O-Cel 16L Insulating Brick. This newest member of the J-M diatomaceous silica insulating brick family has *less than 0.1% reversible thermal expansion at 1600F.* Conductivity is 1.07 Btu in/sq ft/F/hr at 1000F mean temperature with a density of 33-35 lb/cu ft. Cold crushing strength is 350 psi. Sil-O-Cel 16L serves equally well as back-up insulation or exposed refractory lining.

For back-up at higher temperatures, specify Sil-O-Cel® Super Insulating Brick with an unusually high temperature limit of 2500F.

Write today for further information on Sil-O-Cel Insulating Brick and Insulating Fire Brick. Ask for Brochure IN-115A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 565 Lakeshore Road East, Port Credit, Ontario.



Johns-Manville *first-in* **INSULATION**

MATERIALS · ENGINEERING · APPLICATION

the BUSIEST press at LENNOX FURNACE

no downtime reported for this H-P-M Hydraulic

If you've a spot for a real "workhorse" let the Lennox story prove a point. This versatile H-P-M 400 ton press is used for drawing, blanking, forming and other operations and is really paying its way in production output at The Lennox Furnace Company. H-P-M's constant drawing speed . . . smooth fast operation . . . shockless reversal . . . positive overload protection . . . and quick die set up put your toughest metalworking jobs in the profit column. Call in a nearby H-P-M engineer to analyze your parts production. There's no obligation — write today.

"We've operated our H-P-M, 19 hours a day for the past several years without any downtime — it's the workhorse of the shop!"

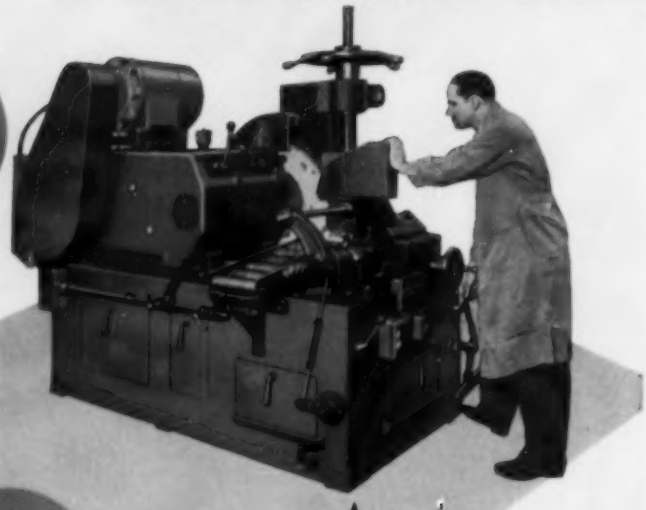
Mr. James H. Bragg
Factory Manager
Marshalltown Plant of
The Lennox Furnace Co.

HPM

THE HYDRAULIC PRESS MFG. COMPANY
1044 Marion Road, Mount Gilead, Ohio, U. S. A.

THE Triple-Chip METHOD IS A *Triple-threat* TO HIGH CUTTING COSTS

CIRCULAR SAWING MACHINES



M. & M. No. 3 circular sawing machine for cutting off metal up to 11-5/8" diameter.

SAW BLADE SHARPENERS

Three automatic M. & M. blade sharpeners impart the Triple-Chip or conventional grind to M. & M. saw blades up to 120" diameter.

SAW BLADES

M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to *your* cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. *Just such a study of your job is yours for the asking.* We offer you an unmatched experience in the sawing of metal, ferrous or non-ferrous, titanium to magnesium, from 1/4" to 43" diameter.

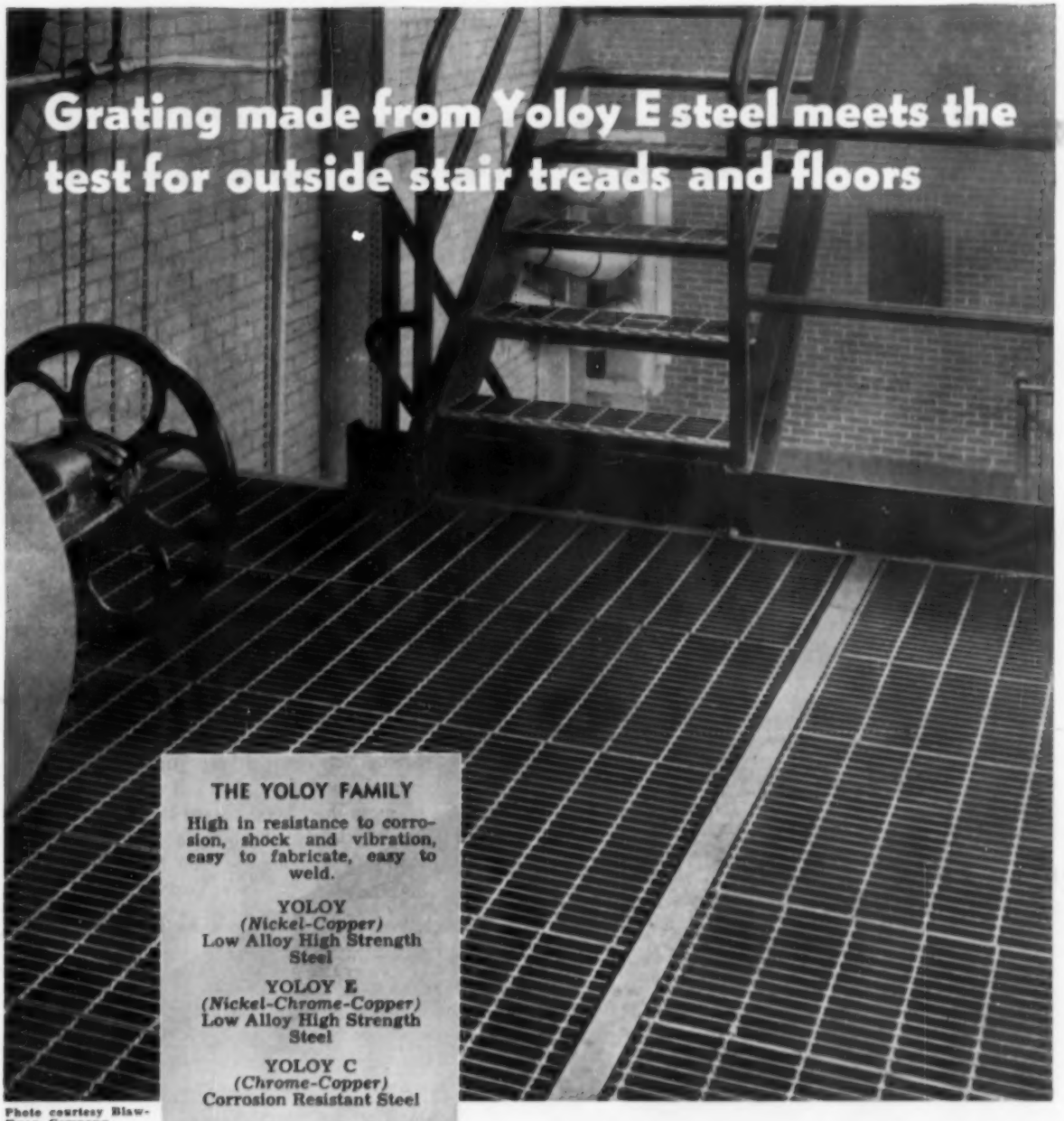
THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

Grating made from Yoloy E steel meets the test for outside stair treads and floors



THE YOLOY FAMILY

High in resistance to corrosion, shock and vibration, easy to fabricate, easy to weld.

YOLOY
(Nickel-Copper)
Low Alloy High Strength Steel

YOLOY E
(Nickel-Chrome-Copper)
Low Alloy High Strength Steel

YOLOY C
(Chrome-Copper)
Corrosion Resistant Steel

Photo courtesy Blaw-Knox Company.

Youngstown

QUALITY YOUNGSTOWN SERVICE

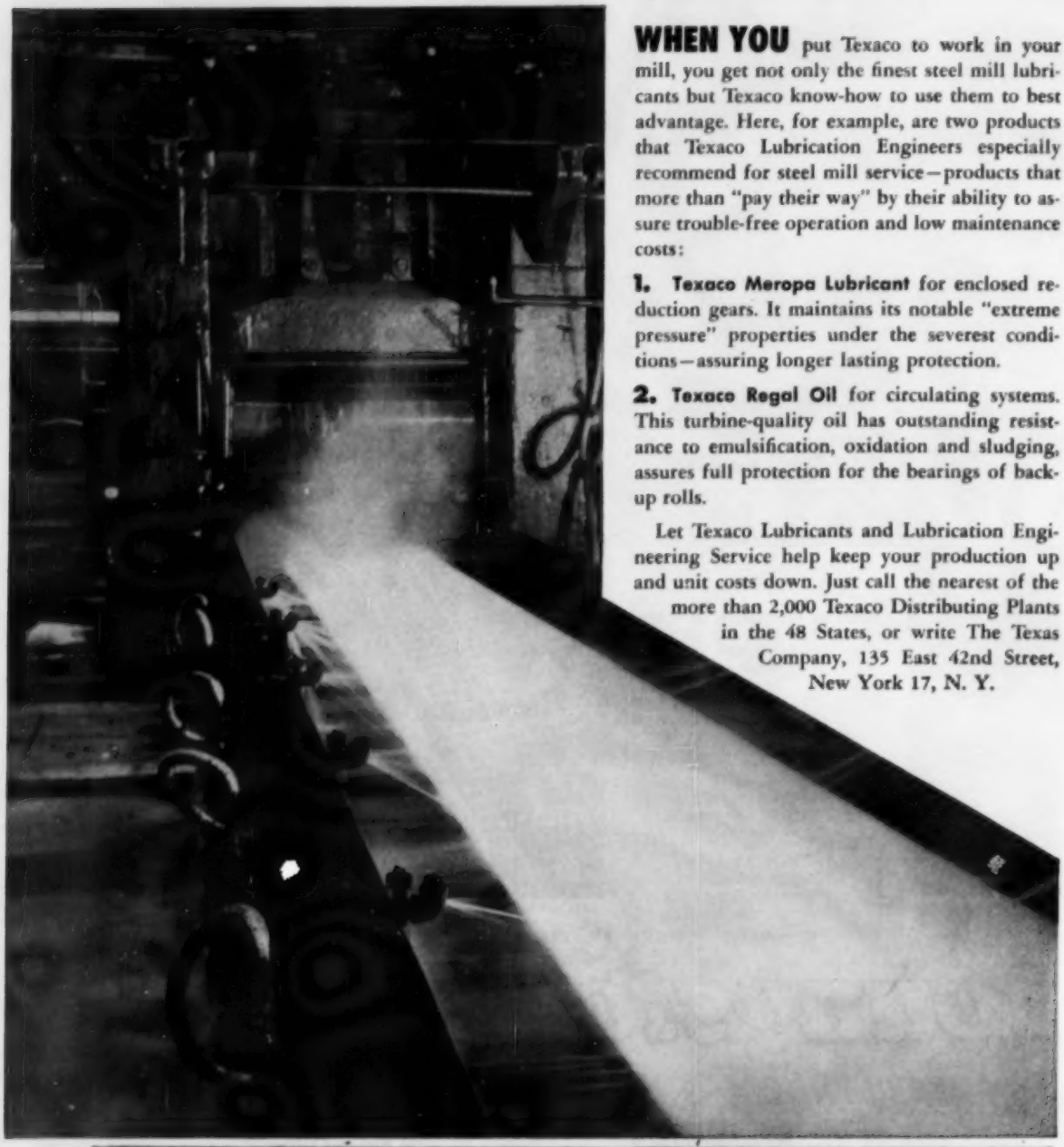
● Safety - durability - atmospheric corrosion resistance - good appearance - all are inherent in this grating fabricated from Yoloy E high-strength steel. The design of such grating contributes toward a non skid surface. The Yoloy family of steels includes several types. For details, write our nearest District Sales Office.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

MORE STRIP COMES OUT... LESS COST GOES IN



WHEN YOU put Texaco to work in your mill, you get not only the finest steel mill lubricants but Texaco know-how to use them to best advantage. Here, for example, are two products that Texaco Lubrication Engineers especially recommend for steel mill service—products that more than "pay their way" by their ability to assure trouble-free operation and low maintenance costs:

1. Texaco Meropa Lubricant for enclosed reduction gears. It maintains its notable "extreme pressure" properties under the severest conditions—assuring longer lasting protection.

2. Texaco Regal Oil for circulating systems. This turbine-quality oil has outstanding resistance to emulsification, oxidation and sludging, assures full protection for the bearings of back-up rolls.

Let Texaco Lubricants and Lubrication Engineering Service help keep your production up and unit costs down. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Lubricants, Fuels and Lubrication Engineering Service

TUNE IN . . . TEXACO STAR THEATER starring JIMMY DURANTE or DONALD O'CONNOR on television . . . Saturday nights, NBC.

STEEL
April 18, 1955

Metalworking Outlook

Matter of Mergers

Business mergers are not on the increase. But they involve greater economic concentrations—more money and larger companies. That's the reason for the growing furor about the trend; that's why the Justice department's Antitrust Division wants $3.1 million to operate in fiscal 1956. The division's chief, Stanley N. Barnes, says there will be no more mergers in 1955 than last year. (There were also no more in 1953 than in 1952.)

Subcontracting Slips

The Navy reports a decline in subcontracting. Since February, 1954, a decline of six percentage points has occurred in the estimate of subcontract dollars placed with small business. Reasons: Reduced military procurement and open capacity within the plants of prime contractors.

More About Marking

The compromise steel marking standard is scheduled for more (perhaps final) discussion on Apr. 26. The Business & Defense Services Administration will be host to steel industry technicians and governmental representatives. They will discuss comments received by the American Iron & Steel Institute from members . . . . Defense department men are attempting to offset International Nickel Co. objections to the marking of high-nickel alloys. The problem is one of economics. Much of Inco's business is of a custom nature. That makes more difficult the use of high-speed, low-cost marking devices.

Ben Fairless To Retire?

On May 3 Ben Fairless becomes 65—the retirement age for U. S. Steel Corp. officials. So he probably will bow out as chairman of the world's largest steel company. Roger M. Blough, vice chairman of the board and general counsel, may succeed him. On May 2 at the corporation's annual meeting, look for Mr. Fairless to announce his plans. He also will reveal U. S. Steel's net profit for the first quarter will be the best for the period in more than 25 years. Also in May, the nation's second largest steel firm, Bethlehem Steel Corp., will have news for stockholders. It will offer them $191.7 million in debentures. The company says proceeds will go for "general corporate purposes."

Ford Facts This Year

You can expect Ford Motor Co. to publish its financial and operating facts this year for the first time since the company was founded in 1903. Chairman Ernest R. Breech made that prediction in New York last week. The announcement adds further support to the strong rumor that Ford stock soon will be sold to the public.

Sparring on GAW

United Auto Worker talks with Ford and General Motors Corp. are still in the sparring stage. Serious body blows won't be coming until closer to the

Technical Outlook—p. 103 Market Outlook—p. 145

late May deadlines. Besides the guaranteed wage, the UAW asks for a 10-cent hourly wage increase, higher adjustments in the escalator formula, a two-year limit to contracts, hospital benefits to be fully financed by the company, four-week vacations for workers with 15 years of service or more and improved pensions—including higher company contributions and an open-end maximum to pension payments, now limited to $137.50 a month. Hourly cost per worker of all that and GAW: 50 cents.

Answer on Titanium?

The Defense department's answer to criticism concerning titanium has won the support of titanium producers and fabricators. A BDSA Industry Advisory Committee urges fast action on a program which calls for: Expanded research and development; assistance to industry in finding improved melting and fabricating methods; contracts with engine producers and airframe manufacturers for experimental fabrication; placement of direct governmental orders with the industry for production quantities of mill products—to be furnished at moderate cost to qualified firms for experimental fabrication into military components; experimental use of titanium in tanks and other nonaircraft applications; provision for wider use in aircraft on the same basis.

Quotable Quote

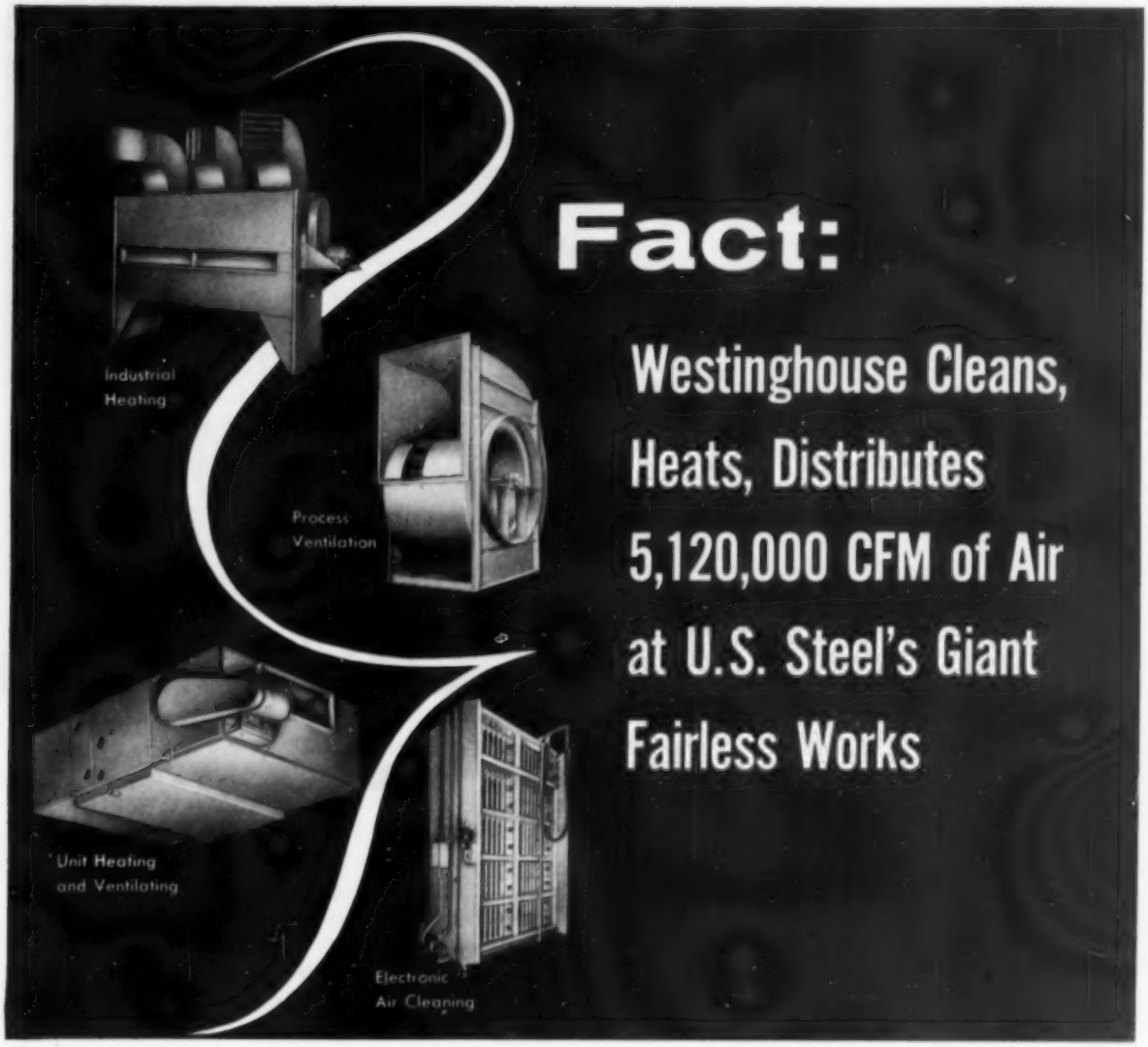
Says Robert E. Wilson, chairman of Standard Oil Co. (Indiana): "We're in danger of becoming a nation of economic hypochondriacs—taking our economic temperature every hour, on the hour, and worrying if it isn't exactly at the level we've come to consider normal."

Straws in the Wind

L. D. Silberstein, chairman and president of Penn-Texas Corp., and his associates won their five-month battle for control of Niles-Bement-Pond Co. . . . The Atomic Energy Commission has issued the first three of a series of proposed regulations governing peacetime development of atomic energy . . . Negotiations looking toward a merger of Greenfield Tap & Die Corp. and Morse Twist Drill & Machine Co. have been called off . . . Bureau of Mines officials last week received strong backing from a Senate Interior Metals & Minerals Subcommittee for a plan to upgrade domestic ore containing manganese and to recover the mineral from steel mill slag . . . Stockholders will vote May 26 and 27 on the proposed consolidation of Sperry Corp. and Remington Rand Inc.

This Week in Metalworking

You can bet on a peaceful steel settlement this year, but any wage increase will be partly passed along in higher steel prices (p. 53) . . . The copper outlook is improving (p. 56) . . . Sales are improving for capital equipment (p. 58) . . . A consumer product, aluminum foil, turns to more industrial applications (p. 59) . . . Foreign competition has the domestic bicycle industry wobbling (p. 64) and the scientific apparatus makers worried (p. 65).



Fact:

Westinghouse Cleans, Heats, Distributes 5,120,000 CFM of Air at U.S. Steel's Giant Fairless Works

Westinghouse has made the Fairless Works of U.S. Steel the outstanding steel mill from the standpoint of air cleaning and ventilation.

This plant uses Westinghouse Industrial Heaters, Centrifugal Fans, Air Handling Units, and PRECIPITRON® Electronic Air Cleaners.

Choose the most complete line backed by undivided responsibility. Whether your requirements are for—

1. Heating and Ventilating
2. Industrial Processes
3. Mechanical Draft
4. Cooling and Dehumidifying
5. Electronic Air Cleaning

— put air to work with Westinghouse-Sturtevant apparatus.

MORE FACTS?

Call your nearest Westinghouse-Sturtevant Sales Engineer . . . he's the "Man with the Facts" on heating, air handling, and electronic air cleaning . . . or fill in the coupon below.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S

Westinghouse

J-80432

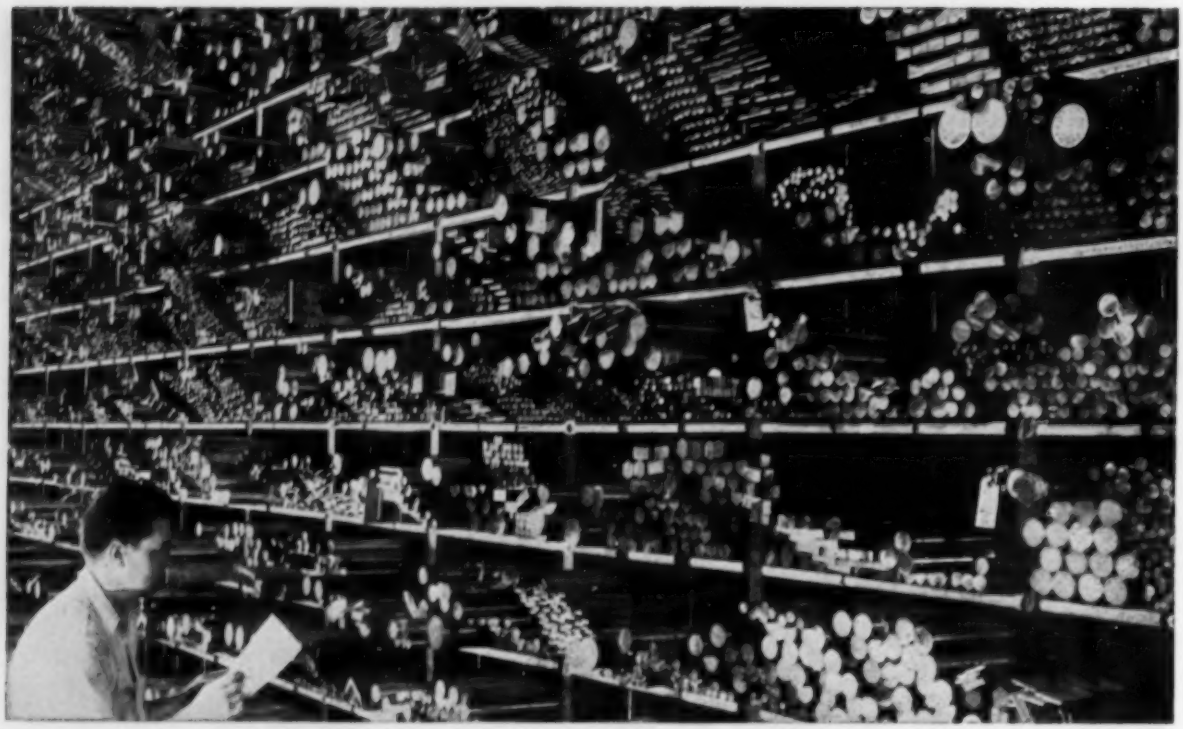
Westinghouse Electric Corp.
Sturtevant Division, Dept. 14C
Hyde Park, Boston 36, Mass.

Please send more facts on your Complete Line.

NAME AND TITLE .....

COMPANY .....

CITY ..... STATE .....



Here's a STAINLESS "DEPOSIT" that You Can Draw on

Here's stainless steel bar stock ready for your instructions. It's just part of Armco's mill "bank" of finished products. When you can use stock that's on the racks, there's no waiting for the rolling of your order. It's ready now! Just tell us what you need and how you want it shipped.

SEMI-FINISHED STOCK TOO

In addition to finished bar and wire stock, Armco carries a large inventory of semi-finished stainless steel. These blooms, billets and rods are kept for quick conversion into standard and special sizes and shapes.

ALL STANDARD TYPES

Armco produces all standard analyses of stainless steel and special types in a wide range of sizes, forms and finishes. In free-machining types alone there are 11 different bar and wire grades. No other single plant can ship you stainless bars and wire in as wide a range of analyses, forms and conditions.

WHY HOLD UP PRODUCTION?

If you have reasonable quantities of stainless parts to make, we can probably supply you all the bars you need from stock. If your needs are large let us start you out with a stock shipment and follow with a rolling order—so there will be no time lost.

Give us a try! Just note quantities, types and sizes that you require on the attached coupon and mail it to us. We'll tell you promptly what we can do.

ARMCO STEEL CORPORATION
1005 Curtis Street, Middletown, Ohio

Give me price and shipping promise on these items of stainless steel:

Quantity	Type	Size and Finish

NAME:

FIRM:

STREET:

CITY: ZONE: STATE:

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SPECIAL STEELS

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • ARMCO INTERNATIONAL CORPORATION

Plant Layout

Last week we watched Ford Motor Co. move into its new assembly plant in Louisville. The operation was interesting for many reasons, but we were most impressed by the promised efficiency of the new plant layout.

Ford engineers say the plant is a "single integrated machine." All its material handling methods are postwar developments. The lengths and speeds of its seven miles of conveyor systems are based on research undertaken before the plant was built. Assignment of stock areas and width of aisles are part of a carefully developed plan which takes into consideration the requirements of each work location on the production line, as well as reserve stock space, transportation and handling.

Ford manufacturing engineers planned the flow of cars and the placement of machinery and equipment on a mockup, using plastic three-dimensional models.

Even for the automotive industry, the Louisville plant is a model for efficient layout. It utilizes the fewest possible men to do a job. Each man goes through minimum motions and uses time and energy sparingly. Materials move the shortest distance between operations, move as seldom as possible and generally keep moving. Machines have little idle time, are arranged in sequence and are suited for the use to which they are put.

Few metalworking companies can go as far in modernizing plant layout as did Ford in Louisville. But most can gain substantially in efficiency through better arrangement of men, materials and machines. Some helpful hints on better layout will be found in the third of this publication's Program for Management Series on page 93.

During wartime and postwar expansion, many plants grew like Topsy. Facilities were added without too much consideration for efficiency. Often those layouts are inadequate for today's competitive economy. Even if your plant layout was pretty good when installed, it may have become obsolete because of new developments in handling methods or equipment. Advances made by competitors have the same effect.

Now is a good time to take a critical look at your plant layout. Can it be improved?

Walter J. Campbell

MANAGING EDITOR

Can you save

7¼¢ a lb.

on stainless?

With nickel prices rising, many companies will be re-examining their stainless applications to see if Type 430 straight-chrome stainless can be used where corrosive action is not too severe. Ryerson has taken the lead in anticipating your requirements by re-stocking Type 430 sheets in all the gauges and sizes you need.

So right now at Ryerson you can save 7¼¢ a pound if you can use Type 430 instead of nickel-bearing types. Even on a single 48 x 120 sheet of 16-gauge stainless this means a cost reduction of $7.47 with Type 430, plus additional savings because of lower weight. And you may also want to consider Type 430 as insurance against any shortage of nickel-bearing types.

You'll save time, in any case, by calling Ryerson because here you draw on the nation's largest stocks of both straight-chrome and nickel-bearing Allegheny stainless and here you put unequalled stainless experience to work for you. So for quick, complete stainless service—call your nearby Ryerson plant.

Technical data on Type 430 or other stainless steels sent on request.

ALLEGHENY STAINLESS IN STOCK

BARS—Round, square, flat and hexagon; also angles
PLATES—Extra-low carbon types . . . many others
SHEETS & STRIP—Twelve types to meet every requirement
PIPE & TUBING—Light wall, standard and extra heavy sizes
FITTINGS—Screwed, welding and Quikupt fittings, also valves
FASTENINGS—Screws, bolts, nuts, washers, pins, rivets, etc.

OTHER STEEL PRODUCTS IN STOCK

STRUCTURALS—Channels, angles, beams, etc.
CARBON STEEL BARS—Hot rolled and cold finished
PLATES—Many types including Inland Safety Plate
SHEETS & STRIP—Many types and coatings
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ALLOYS—Including fastest machining leaded alloys

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC.

STEEL—SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND • DETROIT
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Colorado Fuel & Iron Corp.

Steel Wage Boost Taking Shape

Recent harmony in labor-management relations will carry through to June wage negotiations. Neither side has anything to gain from a work stoppage

THERE'LL BE NO steel strike this year. Betting is that a wage increase will be negotiated, and that a major part of the costs will be passed along to steel users.

Peace predictions stem from several sources. Expecting good business to continue, management doesn't want production interrupted. The steel industry will be operating at about 90 per cent of capacity by the June-30 deadline. Last year, a 12-cent package was negotiated while the operating rate was down around 67 per cent.

Good Times—Steelworkers don't want a strike. After a lean 1954, this year's fat paychecks are looking good to them. Cost-of-living indexes are stable, and the American Iron & Steel Institute says that the average steel wage in February was a record $2.40 an hour. That means steak on Sunday and more during-the-week comforts.

Other factors: Consumer debt is pushing new peaks, and steelworkers like to pay their mortgages on time as much as anyone else. It would be hard to sell them on striking for a few cents an hour.

David J. McDonald isn't the man to try. He is among the most management-minded of labor leaders, and is expected to honor the provisions of this year's contract, which call for wage negotiations only. It's even being voiced around that he would prefer not to negotiate at all. Things are running smoothly enough as is.

Joker—Unfortunately, Mr. McDonald's hand will be forced. His rivalry with Walter Reuther makes it a lead-pipe cinch that if the United Auto Workers gain substantial concessions, Mr. McDonald will have to get something for his steelworkers.

This is all the more sure because the UAW settlement is due before serious negotiations start in steel. General Motors' contract expires May 29, Ford's on June 1. Steel producers and the union have until June 30 to reach an agreement.

Politics — Like the competition between rival labor leaders, competition at the company level between Ford and GM will affect wage settlements. Despite record high production rates, says *Ward's Automotive Reports,* Apr. 1 inventories (about 640,000 cars) were less than those a year ago. With the big auto sales season still a month away, dealers have less than a month's supply on hand.

Since neither GM nor Ford have built big enough backlogs to thumb their noses at the UAW,

Will Steel Minimum Wage Rates Go Higher?

(Base Hourly Pay in Cents per Hour)

	Hourly wage (cents)	Per cent over 1915
July 1, 1954	157.0	685.0
June 12, 1953	152.0	660.0
Mar. 1, 1952	143.5	617.5
Dec. 1, 1950	131.0	555.0
July 16, 1948	118.5	492.5
April, 1947	109.0	445.0
February, 1946	96.5	382.5
July, 1942	78.0	290.0
April, 1941	72.5	262.5
March, 1937	62.5	212.5
November, 1936	52.5	162.5
Apr. 1, 1934	44.0	120.0
Aug. 19, 1933 (NRA)	40.0	100.0
May 16, 1932	33.7	68.5
Oct. 1, 1931	39.6	98.0
August, 1923	44.0	120.0
Apr. 16, 1923	40.0	100.0
Sept. 1, 1922	36.0	80.0
Aug. 29, 1921	30.0	50.0
July 16, 1921	37.0	85.0
May 16, 1921	40.5	102.5
Feb. 1, 1920	50.6	153.0
Oct. 1, 1918	46.2	131.0
Aug. 1, 1918	42.0	110.0
Apr. 16, 1918	38.0	90.0
Oct. 1, 1917	33.0	65.0
May 1, 1917	30.0	50.0
Dec. 15, 1916	27.5	37.5
May 1, 1916	25.0	25.0
Feb. 1, 1916	22.0	10.0
1915	20.0	

Compiled by STEEL

prospects for a quick settlement in autos are improving.

Background — The relationship between management and the steelworkers has been improving steadily the last three years. Neither side wants to disrupt this situation—another strong factor for peaceable settlement of the wage issue.

Any wage increase will be passed on to users as fast as steel companies can put out a new pricing schedule. It's gossipped that prices will go up within the week after negotiations close.

The industry figures that if steelworkers get a 1-cent increase, the average cost of steelmaking goes up 40 cents. If 6 cents were granted, steelmaking costs would climb $2.40 a ton. If 10 cents were the figure, costs would jump $4. That formula is conservative, since even in a straight hourly wage settlement, there are hidden costs in increased overtime and vacation payments.

Load Sharing—Steel companies will probably absorb some of the costs. Last year, a 10-to-12-cent package was granted. The formula would call for an increase of $4.80 a ton. But the companies increased average prices only $3, varying from $2 a ton on rerolling slabs to $6 a ton on some alloy and wire products.

Big Squeeze — Steel companies have been feeling the squeeze. Although profits are good, the gap between funds available for replacement and modernization of plant and equipment and the cost of financing this work presents a continuing crisis.

Steel's big labor problems might well come next year, when contracts will be opened for complete re-appraisal. If Mr. Reuther has won something he can call GAW, Mr. McDonald will have to do at least as well for steelworkers.

Iron Ore Imports Hit Peak

Iron ore imports were the greatest in history last year. American Iron and Steel Institute gives the total as 17.7 million net tons—42 per cent greater than the previous record set in 1953.

Iron ore properties in Venezuela, Canada and Liberia, largely developed by steel companies in this country, supplied 60 per cent of the total iron ore imports during 1954. Venezuela was the source of 5.8 million tons, 2½-times as much as in 1953 when the new ore properties were less developed. Canadian ore fields shipped nearly 4 million tons to the United States —90 per cent more than 1953. (Last year Canada imported nearly 3 million tons of ore from the United States.) Imports of Liberian ore were up 6 per cent, to 857,000 tons.

Peru has become a major source of iron ore for blast furnaces in the U. S. during the past two years. This country received nearly 2.2 million tons of ore in 1954 as compared with less than 1 million tons received in 1953.

Imports of iron ore from Chile and Sweden declined notably during the past year. Shipments from Chile dropped from 2.6 million, tops in 1953, to 1.8 million tons last year. Sweden's shipments dropped to 1.7 million tons, down 600,000 tons from 1953.

Container Business Up

In the closing months of 1954, the container industry approached 1953's record levels of operation. The Department of Commerce says demand continued strong into 1955. Virtually all container industries expect more business in 1955 than in 1954—a few predict record operations.

Some 1954, fourth-quarter operations were higher than the corresponding period of 1953. Among those showing increases: Metal and plastic caps, 5.8 per cent; metal cans, 4.9; and home canning closures, 14.6. Typical decreases were: Milk bottle closures, 9.5 per cent;

glass containers, 6 per cent; steel barrels and drums, 3.4 per cent; textile bags, 9.1 per cent; and reconditioned steel barrels and drums, 0.8 per cent.

Atomic Power Projects Proposed

Private industry is ready to shoulder almost all the financial obligation involved in building four nuclear power stations. The Atomic Energy Commission has received four proposals which ask government funds for only 10 to 20 per cent of the cost of the proposed plants.

Proposals will be considered on a competitive basis, reports AEC. The $75 million included in its 1956 budget for civilian power programs would permit it to accept all four, involving an expenditure of about $150 million.

Companies submitting proposals: 1. Commonwealth Edison Co., Chicago, to build a boiling water reactor plant in the Chicago area with 180,000-kw capacity. 2. Yankee Atomic Electric Co., Boston, to build a light-water moderated and cooled reactor plant in Massachusetts with 100,000-kw capacity. 3. Detroit Edison Co., to construct a fast breeder reactor in the Detroit area with 100,000-kw capacity. 4. Consumers Public Power District of Columbus, Nebr., to build a sodium-graphite reactor in Nebraska with 75,000-kw capacity.

Merging: Ten Uranium Firms

Amalgamation of ten uranium firms is expected. To be called Federal Uranium Corp. of Nevada, the new firm will have some 12,000 stockholders, with reported capital of $100 million.

Formation of the new organization was virtually assured when approval was received from Federal Uranium of Utah which will be the largest stockholder in the Nevada-chartered firm. Seven other companies already had given approval.

Stockholders of P&I Uranium Corp. have deferred approval of the merger until Apr. 20. They have appointed a committee to visit Salt Lake City, Utah, to obtain more information on the merger.

Re-equip To Offset Wage Hikes?

Here's a formula to determine the extent of re-equipment needed to cancel out spiraling labor costs. It's an accounting procedure developed by a consulting firm

FACTORY HOURLY wage rates have advanced 36 per cent in the last five years. The trend is still upward. If a Guaranteed Annual Wage is adopted, the move may accelerate the rise.

Has this increase in hourly wage cost been offset by capital investment in improved machinery and more efficient practices? In the face of rising labor costs, will manufacturers be able to recover the funds spent in capital investment?

Tough Questions—Eddy-Rucker-Nickels Co. feels that these questions cannot be answered by conventional accounting practices. By using the firm's "Rucker's Principle," say these management consultants, the answer can be found. Its step-by-step procedure:

1. Divide production value by the total man-hours worked (direct and indirect labor combined). The resulting figure (see chart) is economic productivity per man-hour.

2. From economic production per man-hour, subtract the average gross hourly earning of all factory workers, including fringes and cost of deferred benefits.

3. The remainder is management's return, or gross operating margin per man-hour of labor, in dollar and cents. This figure should rise to recoup the added cost of increasing capital investments. Noteworthy is the fact that industry obtained a gain of 78 cents per man-hour in 1954 over the 1949 level.

4. Whether this margin per man-hour of labor shows a consistent return on rising production is shown in line five of the accompanying chart. This share should be a near constant.

Insurance—This near constant is industry's assurance that its gain per man-hour is consistently proportionate to the rise in money productivity. For 1954, the gain over the 1947-49 level was 38 per cent—almost the same as the 37 per cent increase in money productivity per man-hour and the 36 per cent increase in average hourly wages.

Premium Pay for New Engineers

Starting salaries for engineering graduates reached an all-time high, reports Illinois Institute of Technology, Chicago. Members of its January graduating class received an average salary of $383 per month—up $10 from a year ago. Highest pay went to chemical engineers, an average of $398. The mechanical engineering field saw the biggest dollar increase as salaries jumped from $370 to $392 a month. Some 200 companies interviewed Illinois Tech graduates.

Manufacturers' Operating Margin Above Labor Costs

All U. S. Manufacturing

Per Man-Hour	1951	1952	1953	1954
1. Production Value	$4.04	$4.25	$4.48	$4.59
2. Hourly Gross Wages (subtract)	1.61	1.67	1.77	1.81
3. Hourly Operating Margin	$2.43	$2.58	$2.71	$2.78
4. Increase Above Base (Base is $2 in 1947-49)	$ .43	$ .57	$ .71	$ .78
5. Per Cent Margin to Production Value	60.15%	60.71%	60.60%	60.60%

More Copper After June

New markets assure favorable outlook for the industry, says treasurer of Kennecott

COPPER SUPPLY should become more comfortable some time in the third quarter, says E. S. Hann, treasurer, Kennecott Copper Corp.

But, he stated, if the present high rate of operations in the automobile, electrical equipment and construction industries continues, the tight copper supply could be extended in spite of increasing production at domestic mines and abroad.

Outlook—Prospects for the copper industry are bright, Mr. Hann told the New York Society of Security Analysts. In 1956, demand for the red metal will about equal available supplies; over the longer term, the industrial growth of the U. S. and other free world countries, plus new uses, will absorb any additional production coming on the market.

Intense competition among copper, the light metals and plastics is certain, with price an important factor, he said. But it's likely that copper will maintain most of its present markets. Spots where competition with aluminum will be especially spirited are in the electrical industry and as a substitute for brass.

New Markets—Meanwhile, copper is gaining some new markets of its own, such as in tubing for radiant heating. The revival of colonial-type furnishings and the splurge in ranchhouse architecture are creating large demand for copper and brass.

New markets with possibilities are air conditioning, heat pumps and automatic control equipment.

Exploration — Kennecott has found the economic climate abroad becoming more favorable. Field explorations are under way in South America, Africa, Europe and Australia. We are on the lookout for all base, precious and other metals and minerals, Mr. Hann stated.

In Canada, the company is investigating a copper deposit and a valuable heavy mineral deposit, but it will be a year or more before it knows whether they warrant development.

Alcoa Heavy Forgings Due

Aluminum Co. of America's $40-million link in the Air Force's heavy forging press program at Cleveland will start May 5.

A 50,000 ton press built by Mesta Machine Co., Pittsburgh, and a 35,000-ton unit from United Engineering & Foundry Co., also of Pittsburgh, will form wing spars and other major aircraft structural parts for Uncle Sam's mightiest planes.

Previously, the parts were built up from many smaller components. The big presses are expected to cut both machining and assembly costs substantially.

GM Gets Auto Choke Patent

An important automatic choke patent has been granted to General Motors Corp. more than 23 years after the application was filed. Conflicts with other pending patents made the case one of the longest on record.

The patent covers many of the basic features of automatic chokes, but GM can't claim any infringements prior to the date the patent was issued.

Bolts, Not Rivets, Used In 18-Story Building

High-strength bolts made by Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., went into the structural assembly of an 18-story apartment building in New York. Carburized washers are installed under both head and nut to permit generation of the torque required without scoring the connecting material. A two-man crew using an impact wrench assembles the bolts (35,000 were used). The nut on a high-strength bolt can be tightened up to steel yield strength—42,000 lb for a 1-in. bolt

Industry Aids Colleges

But schools find rough going as costs go up and an increase in enrollments looms

INDUSTRY'S HELPING HAND is extended to the nation's colleges and universities. America's 672,000 corporations gave over $70 million to higher education in 1953, estimates the Council for Financial Aid to Education Inc., New York.

The rate of corporation giving for all purposes is increasing. The share of the corporate gift dollar going to education also is rising. Percentagewise, most smaller companies contribute more than larger ones.

In giving, companies tend to favor schools in areas where they have natural interests. They prefer to give to independent, non-tax-supported colleges and universities. They show nearly equal preference for technical schools, independent universities and liberal arts colleges.

In Trouble — Despite increased corporate giving (often totaling more than alumni gifts), the nation's schools find themselves in financial straits. The council's recent survey indicates that half the colleges and universities find red ink on their educational balance sheet. Average per capita operating costs have increased 50 per cent since 1948. Fees and tuitions have not been increased proportionately, to avoid pricing able students out of the classroom.

Teachers' salaries have not kept pace with the cost of living, up 93.4 per cent in 15 years. Among 54 tax-supported universities surveyed, salaries rose an average of 88 per cent from 1939-40 to 1953-4. Among 66 independent universities, average salaries of undergraduate teachers rose to $4546 in 1953-4, an increase of 60 per cent; at the graduate and professional level, the increase was 57 per cent, to $5513.

Billions Needed—To make up present deficiencies and meet the bulge in enrollment expected over the next 10 years, institutions having about three-fourths of the student enrollment report they need over $3 billion in additional endowment, plus $2.5 billion of new funds for buildings, equipment and maintenance.

Tax Amortization for Du Pont

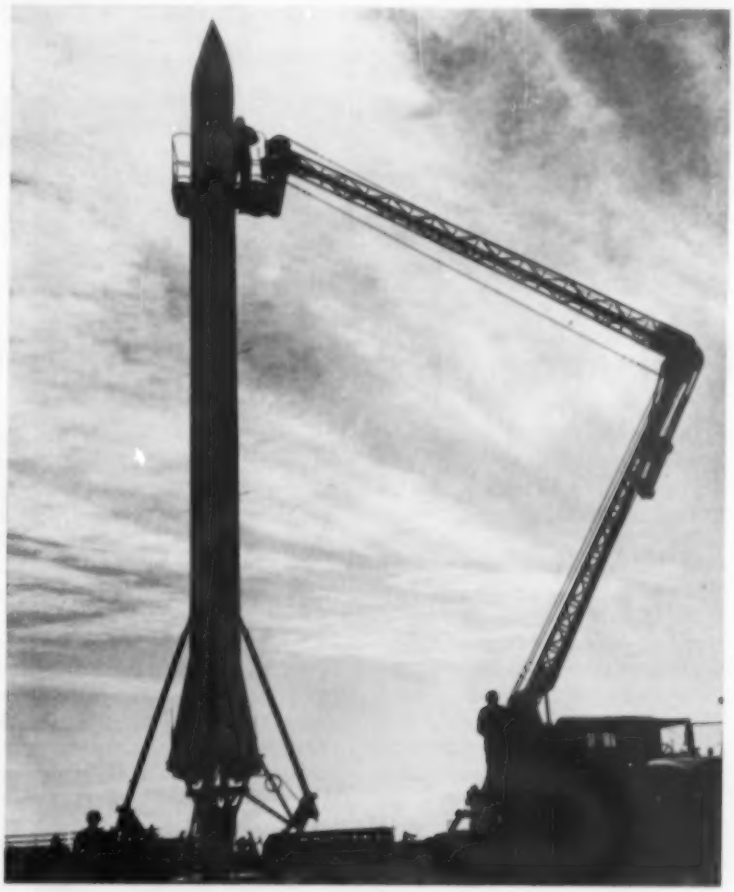
E. I. du Pont de Nemours was granted a certificate of necessity for accelerated tax amortization of its $40-million, titanium-sponge facility at Johnsonville, Tenn., by the Office of Defense Mobilization. Other large certificates of necessity went to Texas Eastern Penn-Jersey Transmission Corp., Shreveport, La., for a natural gas pipeline and to the Baltimore & Ohio Railroad for a tunnel.

Of 52 certificates issued recently, 18 are for facilities involving small businesses. Represented in the expansion are military aircraft parts, petroleum storage facilities and electronic components.

Ready: Capital Goods Study

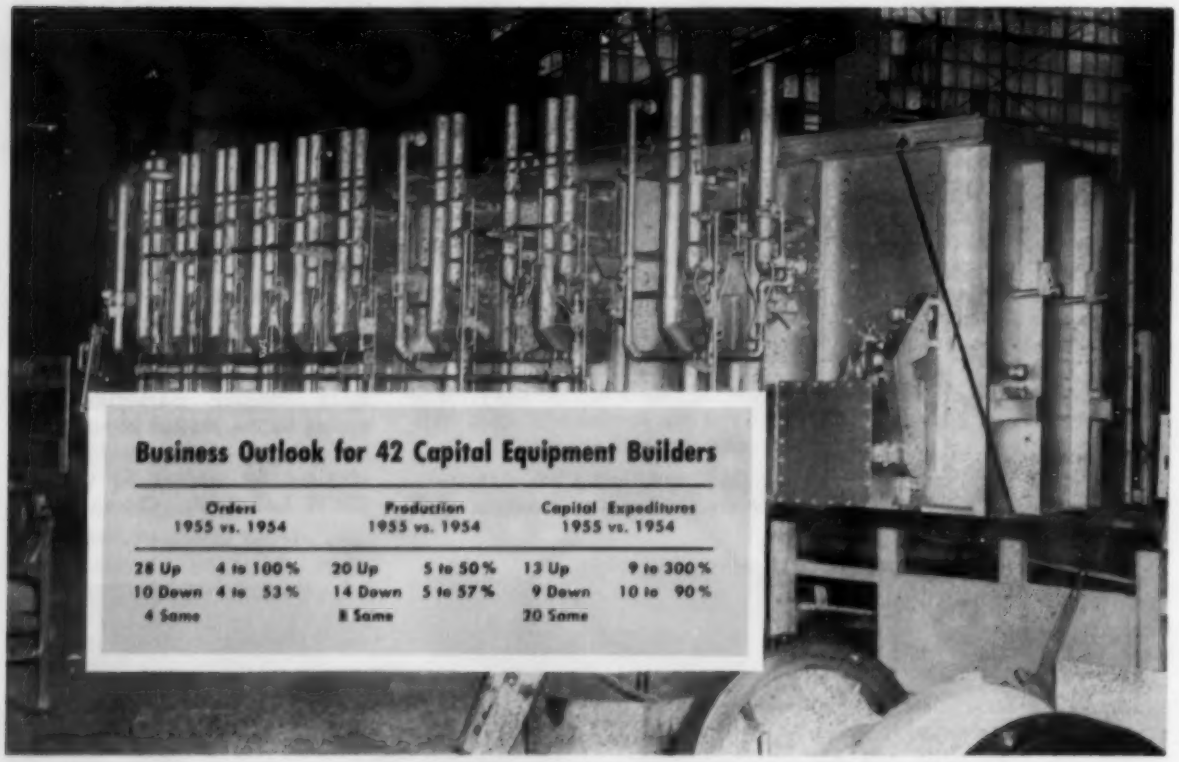
A new study, "Marketing Research — A Guide for Capital Goods," is available from the Marketing Council of the Council for Technological Advancement (CTA).

The CTA marketing group was formed two years ago to introduce more effective marketing techniques to the capital goods industry. Copies of the study may be obtained by sending $3 to CTA, 120 S. LaSalle St., Chicago 3, Ill.



Lifting Sales to $1 Million

Up in the air 65 ft, needing only a final adjustment, is the warhead of a guided missile. A personnel lift reaches up and over, with an Army ordnance expert to do the job. Ability to design and produce this unit has been a boon to Hi-Tender Co., Leavenworth, Wash.—its annual gross volume has jumped from $60,000 to more than $1 million in three years. Originally designed to pick apples, its smaller versions are used to service light and power lines, mercury vapor lights and do maintenance work



Business Outlook for 42 Capital Equipment Builders

Orders 1955 vs. 1954		Production 1955 vs. 1954		Capital Expenditures 1955 vs. 1954	
28 Up	4 to 100%	20 Up	5 to 50%	13 Up	9 to 300%
10 Down	4 to 53%	14 Down	5 to 57%	9 Down	10 to 90%
4 Same		8 Same		20 Same	

Orders, shipments, production will rise in 1955 as . . .

Equipment Prospects Brighten

CAPITAL EQUIPMENT makers predict an upturn. A survey of 42 (see chart) reveals a general increase in backlogs.

The Department of Commerce reports that capital expenditures for plants and equipment may reach $27.06 billion this year. Spending may rise from a seasonally adjusted annual rate of $26 billion in the first quarter to about $27.5 billion in this second period. Capital expenditures hit $26.83 billion in 1954, $28.39 billion in 1953.

While there will be general improvement in 1955 for capital equipment, what about specific types of apparatus?

Machine Tools—Sales should hit $910 million in 1955, compared with $892 million in 1954. While that's an improvement, it's still below 1953's $1.2 billion. The show next September in Chicago should boost the last quarter's performance.

Industrial Furnaces—Producers are expecting a 10-to-15-per-cent pickup in 1955 over 1954. Last year's business dropped an estimated 20 to 25 per cent below 1953's. The rise in the use of heat treating and the trend toward automation are boosting sales.

Construction Machinery — If President Eisenhower's $101-billion, highway-expansion program goes through, an estimated $3.5 billion in new machinery will be needed. In addition, replacement requirements will hit $1 billion a year. Exports of construction equipment are gaining. This year's sales will be well above 1953's record $357 million.

Welding Machinery—This year's volume should hit $100 million, compared with $84 million last year. By 1970, the consensus is that annual volume will reach at least $130 million.

Conveyors—Sales should peak at $313 million in 1955, compared with $285 million last year. Automation is behind the gains.

Scientific Apparatus — Another high is coming for this kind of equipment (see p. 65). A record $214 million worth will be sold this year, compared with $203 million in 1954 and $212 million in 1953.

Packaging Machinery — Makers are also riding high. Sales last year reached $160 million. Pressured by rising costs, both consumers and packagers are keeping the 70 major designers bent over the drawing boards. Orders are mounting.

Experts predict a continuing growth for the rest of the decade. For example, K. M. Patterson, industrial sales manager for Westinghouse Electric Corp., points out that the purchase of metalworking equipment increased from $3 billion in 1942 to $5 billion in 1954 (all figured in 1954 dollars), and that production in 1955 will be some 50 per cent above the 1947-1949 average. He says metalworking alone will expand 25 per cent in capacity by 1960.

Production increase of 30 per cent is anticipated as . . .

Aluminum Foil Expands Markets

ALUMINUM FOILMAKERS are out to break their 1954 production record of 137.6 million lb. Prospect: They will produce an additional 30 per cent of the glistening product this year.

What's behind this upsurge in sales? "Increasing use of foil in many packaging applications, plus the cigaret industry's change from another foil to aluminum," answers Revere Copper & Brass Inc.

Markets — Packaging applications (which take about 75 per cent of output) are for such routine articles as food, cosmetics, labels and tobacco. Decorative forms are so varied that the consumer often is unaware that the light metal is involved. In packaging applications, aluminum foil can be embossed, lacquered, colored and printed. It resists moisture and contamination, fabricators point out.

Industrial Uses — "We are all aware of packaging uses," says Kaiser Aluminum & Chemical Corp., "but industrial applications are steadily growing." The leading industrial use is in paper and electrolytic capacitors. The electrical industry uses almost 8 million lb of foil annually in capacitors for radio and television sets, telephone circuits, electric motors and power generation.

Another large market is insulation, reports Aluminum Co. of America. Producers believe this application eventually will surpass use in capacitors, as more new homes are insulated with highly reflective aluminum foil. Builders also are using foil in vapor barriers, honeycomb panels and laminated roofing.

New Fields—"While many uses of foil are well known, there are some new uses," reports Reynolds Metals Co. National magazines are printing Reynolds advertisements on foil. Company officials add that growing numbers of people are cooking outdoors with it. It is also finding use in photographic flash bulbs, pipe covering, lithographic plates and air filters.

Most fabricators receive aluminum foil in coiled form. Ekco Foil Container Corp., says: "We are expanding and integrating production facilities to handle a growing market for rigid foil containers." These containers are used to freeze, then reheat and serve food.

Problem—In some applications foil is so thin (0.00025 to 0.007 in.) that it causes handling problems. "We work with foil only a tenth the thickness of paper used in magazines," one fabricator reports. "It is tough to handle, but research is ironing out some of the difficulties."

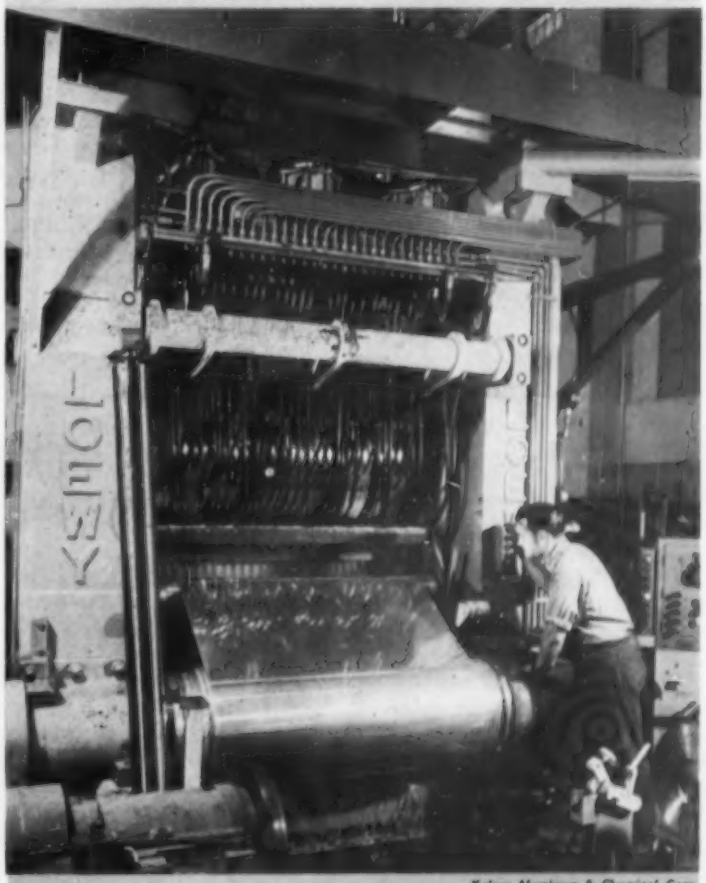
Makers estimate that by 1963 production of aluminum foil will reach 300 million lb—a striking contrast when compared with the production figure of 21 million lb in 1937. Aluminum foilmakers are in an enviable position—sales just keep going up.

Aluminum Foil Shipments

(in lb)

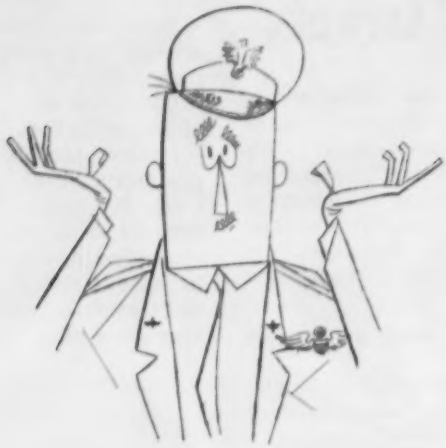
*1955	178,829,518	1953	113,339,717
1954	137,561,168	1950	90,679,719

*Estimated by STEEL



Kaiser Aluminum & Chemical Corp.

Foil is inspected on a Kaiser 60-in. mill



Wanted: Technical Ideas for the Air Force

■ DO YOU have an idea for a new missile? Or a new principle which might revolutionize aircraft design? Or a new material which can stand temperatures that melt ordinary metals?

If so, Lt. Col. M. W. Beardsley is waiting for you. He's the new assistant for innovations in the Air Research & Development Command's Analysis & Evaluation Office. Address him at the command, Box 1395, Baltimore 3, Md.

Why?—The new effort will attempt to reduce the time lag between the conception of a basic idea and its adoption by the Air Force. Proposals submitted should describe the innovation, estimate its expected performance and set out its potential value to the Air Force, such as increasing performance or savings in weight or money.

All proposals will be evaluated by experts in the branch of technology concerned, either at Baltimore or at one of the command's ten centers. The program is intended for organizations or persons not acquainted with the functions of ARDC agencies. Contractors having established relations with ARDC laboratories or offices will continue to submit new ideas through regular channels.

Needed: Industry

■ Some Washingtonians would like to see more than government as an employer in their area.

They're looking into the possibility of getting suitable industries to set up shop. Especially desired are electronics plants and research laboratories that would pay no less than $1.60 an hour for labor.

As big as government is, there may not always be enough governmental jobs for district area people. Its population is growing like that of many other areas. The population scoreboard in the Commerce department's lobby ticks off a U. S. population gain of one person every 12 seconds. That's equal to a Richmond, Va., each month, a Maryland each year and a California every four years.

Plant Dispersal

■ Watch for a more flexible policy on plant dispersal. The government's voice in the matter is largely limited to its control over rapid amortization certificates.

Now applications will be examined case by case. Defense Mobilizer Arthur Flemming has abandoned the idea of applying uniform criteria (such as requiring plants to be 10 miles or more from a major target). Applications also will be considered on a city-by-city or even industry-by-industry basis. To be taken into account, too, will be "economic facts of life" in determining the degree of dispersal.

Dr. Flemming wants to call together a group of citizens familiar with the subject to function as a Hoover-type commission to advise him.

Updating an Index

■ The government's wholesale (primary market) price index has a new weight base. It's the average of the dollar value of primary market transactions in 1952 and 1953. Previously, weights were based on the dollar value of transactions in 1947.

Also among major changes in the weights are a decrease in the relative importance of farm products, processed foods and hides and an increase in the relative importance of chemicals, machinery and equipment, paper and products and fuels other than coal.

Meet Arthur Winston: Assistant administrator of the Business & Defense Services Administration, his office has the primary responsibility of general supervision over four BDSA divisions: Aluminum and Magnesium, Copper, Iron & Steel and Miscellaneous Metals & Minerals.

Mr. Winston is on leave from Dow Chemical Co., Midland, Mich., where he is assistant manager of the Magnesium Department.

Tube Makers Please Note —

A tube mill represents a major investment. Good business practice dictates that before you invest—you should investigate.

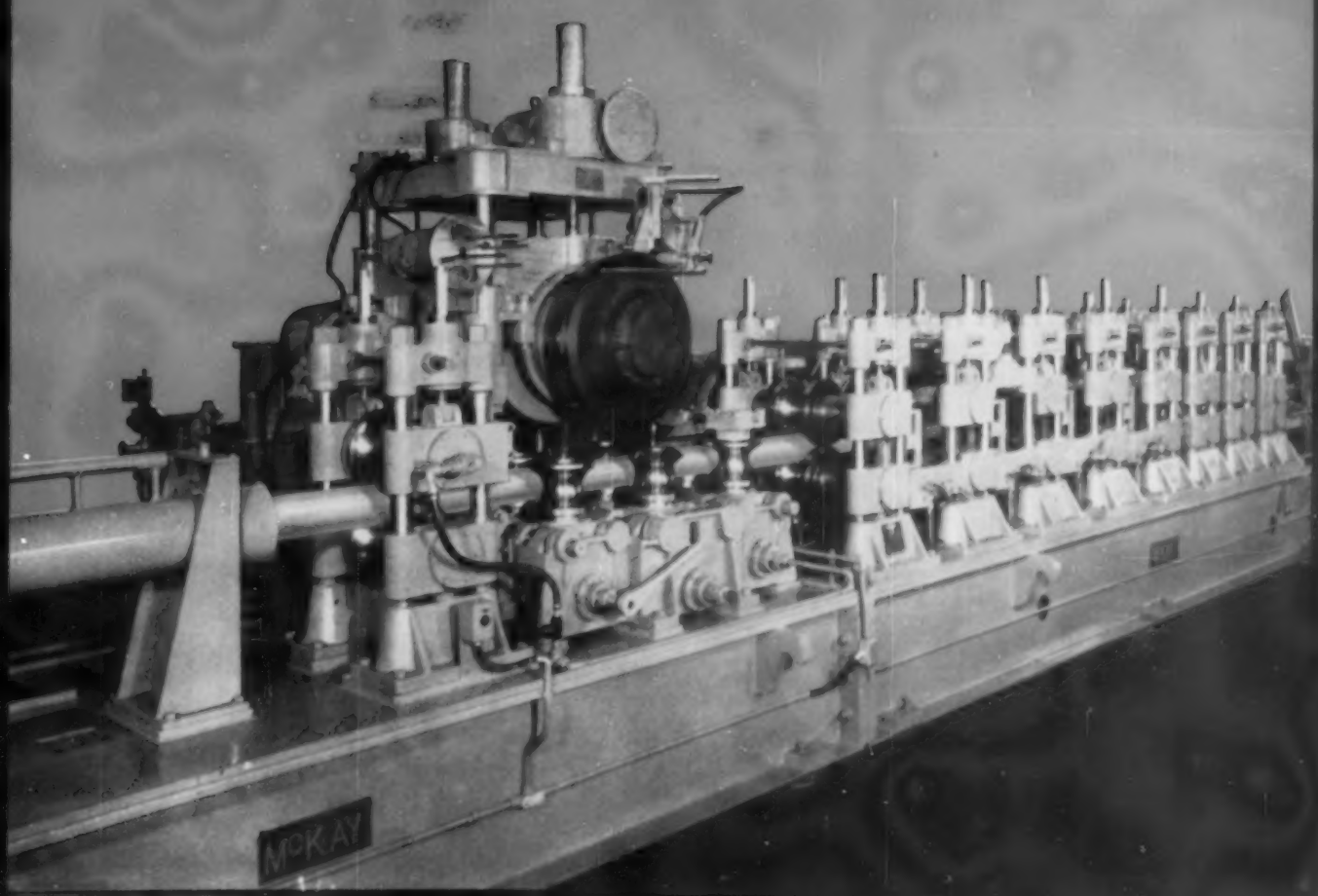
We here at McKay believe we build the finest tube mill made today. We could point to many features that support this belief. However, these features are all a part of our determination to constantly improve the product, and to *never substitute for quality.*

Experience has proved the most expensive single item in tube mill operation is *down time.* This time lost can quickly mount into thousands of dollars — making any savings in the initial cost of equipment trivial by comparison.

Every McKay Tube Mill is designed to deliver the ultimate in PERFORMANCE, PRECISION, RUGGEDNESS and SAFETY. Compare! Investigate thoroughly before you buy and we feel sure you'll specify TUBE MILLS by McKAY.

THE McKAY MACHINE COMPANY, *Youngstown, Ohio*

Designers and builders of modern tube making, forming, sizing, reducing, welding and cut-off equipment.



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New ANGLE WRENCH
with unmatched Torque Control

Ingersoll-Rand introduces a brand new concept in torque control in angle wrenches. This sensational new development shuts off automatically and completely—it does not continue to build up torque.

The New Torque Control Angle Wrench runs series after series of nuts or cap screws to the same tightness . . . eliminates the inaccuracies of former angle wrenches.

- **Easy Adjustment**—quickly and easily adjusted to produce any torque within the selected range.
- **More Durable**—than any previous angle type nut runner. New "valve type" torque control mechanism is less vulnerable to wear . . . more economical to maintain.
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size 38MT

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Killebrew's Job: Create a New Clark Line

SOME COMPANIES enter a new business by evolution. Others break into a new field by starting from scratch. Clark Equipment Co. stepped sideways into the construction machinery business.

From lift trucks and automotive components to construction machinery may seem like a big step, but "it was a natural," says Clarence E. Killebrew, who should know: He's taken some pretty big strides at Clark which are directly connected with the new division's growth.

Now a Veep—Mr. Killebrew joined Clark in late 1952 as assistant to the president. His assignment: Create a new line of machines to broaden Clark's line of material handling equipment, namely tractor shovels. Soon after the project was under way, Clark purchased Michigan Power Shovel Co. The two activities were the basis for Clark's establishment of a Construction Machinery Division, which Mr. Killebrew now heads as vice president.

A mechanical engineering graduate of Alabama Polytechnic Institute, Mr. Killebrew spent most of his preClark years in sales and product research. This background came into play extensively in planning the new division.

A Natural—"Here's why we were a natural for tractor shovels, excavator cranes and crane carriers," explains Vice President Killebrew. "We had the manufacturing facilities within the Clark organization for the engineering design and manufacture of almost all components required to build the equipment."

What was necessary then? Clark listed comparative specifications of equipment on the market, then designed a machine to win approval.

Did this planning pay off? Proof is in the sales. George Spatta, Clark president, told stockholders in his 1954 report that the new division had exceeded its $12-million, first-year objective—and in a year when construction equipment sales were generally off.

On the Move—"We're still gaining momentum," Mr. Killebrew says. "The salesmen are selling those 12-ton machines with the tactics of the appliance and auto people—they're inviting customers to 'compare by demonstration' and 'get behind the wheel and test it yourself.'

"Jumping into a new market is expensive. It takes careful planning," Mr. Killebrew cautions. "You must have the facilities; there must be room in the market; your product must fit the requirements of the market.

"Then," he smiles, "it's a natural."

H. P. Snyder Mfg. Co. Inc.

U.S. Bicycle Manufacturers Take Slide

KNOCKED OFF BALANCE by rough foreign competition, the domestic bicycle-making industry is wobbling badly. Its plight has been recognized by the United States Tariff Commission. Mr. Eisenhower will decide on a relief policy before May 14.

Between 1950 and 1954, bicycle imports had increased more than 1350 per cent, against about 35 per cent in the same period for total manufactured goods imports. The tempo continues to pick up. Imports accounted for 50 per cent of all bicycles sold in this country during the five months ending in February, and had hit 55 per cent at latest count.

Foreign Bike Sales in U. S.

	■ Foreign bicycles sold in U. S. market	■ % of foreign sales to U. S. market
1954	962,977	39.0
1953	593,659	22.8
1952	245,163	11.8
1951	176,263	9.0
1950	66,289	3.4
1946-49 (avg)	26,800	1.3
1931-39 (avg)	11,400	1.3

Source: Bicycle Manufacturers Association

Big Wheel—England has been sending the lion's share of imports, though Germany, France, Austria and Japan are also joining her in outselling the domestic industry. In 1954, England sold 52 per cent of all imported bicycles.

Last year, American manufacturers were forced to cut production to about 1.5 million units and suffered an operating loss. They are faced with further losses and cutbacks in production without tariff help. Believing that restoration of former tariff levels would be insufficient, their solution is a "reasonable limitation on imports through the establishment of flexible quota limitations—based on a fair relationship of imports to domestic sales."

Breakdown—About 200 supplying companies and 15 manufacturers make up the $200-million domestic industry. Last year, due to their sales losses, they consumed less than 30,000 tons of steel. This is the lowest in years. Since most bicycle steel is highly processed, the loss is more important in dollars than in tonnage to steel producers.

Although the industry does not know what shape White House recommendations will take, sentiment has it that some measure of support will be granted.

It's likely, however, that makers also will be expected to help themselves by intensive selling and redesign. Some of the better features of foreign models, like three-speed hubs, are already being adopted.

Scientific Apparatus Sales Up

Research spending of $4 billion by government and industry will help apparatus industry topple its best previous sales year of $212 million

SCIENTIFIC APPARATUS producers are shooting for the moon and expect to reach it. The industry predicts this year's sales will reach $214 million—eclipsing its best previous mark—$212 million in 1953.

Some 1600 scientific apparatus firms, many employing less than 25 workers, had total sales of $203 million in 1954. This year's optimistic forecast is based primarily on the present $4-billion investment by government and industry in scientific study and product development.

SAMA Report—The accompanying table shows annual scientific apparatus sales (except for recorders-controllers) as compiled by the Scientific Apparatus Makers Association (SAMA). The figures represent only sales reported by members.

More than 20,000 different types of apparatus and equipment are made, not including varying sizes of corks, stoppers, tubes or some 15,000 chemical reagents.

Sales Parade — Current sales leaders are instruments keyed to analysis (electronically), automatic process controls, load cell weighing devices (electronic determination of mass), scientific optical goods and precision analytical balances.

Among the larger customers for scientific apparatus are the Atomic Energy Commission and private companies involved in myriad atomic fields — nuclear power, heavy metal, petroleum, chemical, etc.

Quality Control—Another boom to increased utilization of scientific apparatus is the growing application of quality control in manufacturing processes. SAMA has produced a booklet on this subject, *Quality Control and Research*, which provides pointers on developing products for tomorrow's markets.

Imports—Apparatus makers are concerned over the inroads being made by importers. Industry spokesmen, appearing before the Senate finance committee, stated that the apparatus industry requires special skills which may be lost or at least be less efficient if they are not kept in constant use.

The industry maintains that it is important to preserve these skills to retain national security and has recommended that the President be given authority to "take action necessary to assure an adequate supply of such vital skills for any future emergency."

Clear Sailing—While a spot survey by SAMA reveals that analytical balance manufacturers particularly are being affected by imports, the scientific apparatus industry is still looking forward to its best sales year.

Microfilm Saves $150 Million

American business saves over $150 million annually by microfilming. Needless accounting routines, storage space and filing equipment are eliminated, says John K. Boeing, president of Recordak Corp., a subsidiary of Eastman Kodak.

Banking and business are the biggest users, although commercial and industrial users are coming to the fore.

The newest microfilmer can reduce a large ledger sheet 40 times, producing an image on 16-mm film a fraction the size of a postage stamp. A standard roll of 16-mm film for filing is 100 ft long. It will hold 29,000 small bank checks or over 9000 ledger cards.

Chemicals To Quadruple

The chemical industry, now one of the four largest in the country, is slated for a fourfold expansion in size from 1950 to 1975, says the Paley Commission. William C. Foster, president of the Manufacturing Chemists' Association, Washington, thinks its growth in the last four years indicates this prediction may be conservative.

An example is polymer chemistry. Its facilities completed, under construction or definitely planned totaled more than $616 million as of Nov. 30, 1954. It was only an infant 25 years ago.

Accidents Down in 1954

Fewer persons were killed at work during 1954 than in any of the 18 years records are available. Bureau of Labor Statistics estimates place the work-death total for 1954 at 14,000, a 7-per-cent drop from 1953.

The total of all disabling work injuries also dropped sharply in 1954, down to 1,860,000—9 per cent below 1953.

"In manufacturing, the total of 390,000 disabling injuries represented a 19-per-cent drop from the previously year, reflecting somewhat reduced operations, coupled with a favorable improvement in the injury-frequency rate," stated Secretary of Labor James P. Mitchell.

Sales Revive for Scientific Apparatus*

1954 Sales Breakdown			
Laboratory apparatus	$133 million	1955	$214 Million**
Optical instruments	11 million	1954	203 million
Industrial instruments	59 million	1953	212 million
		1952	199 million
		1951	167 million
		1950	122 million

*Except recorder-controller sales. **Estimated by STEEL. Other figures: Scientific Apparatus Makers Association.

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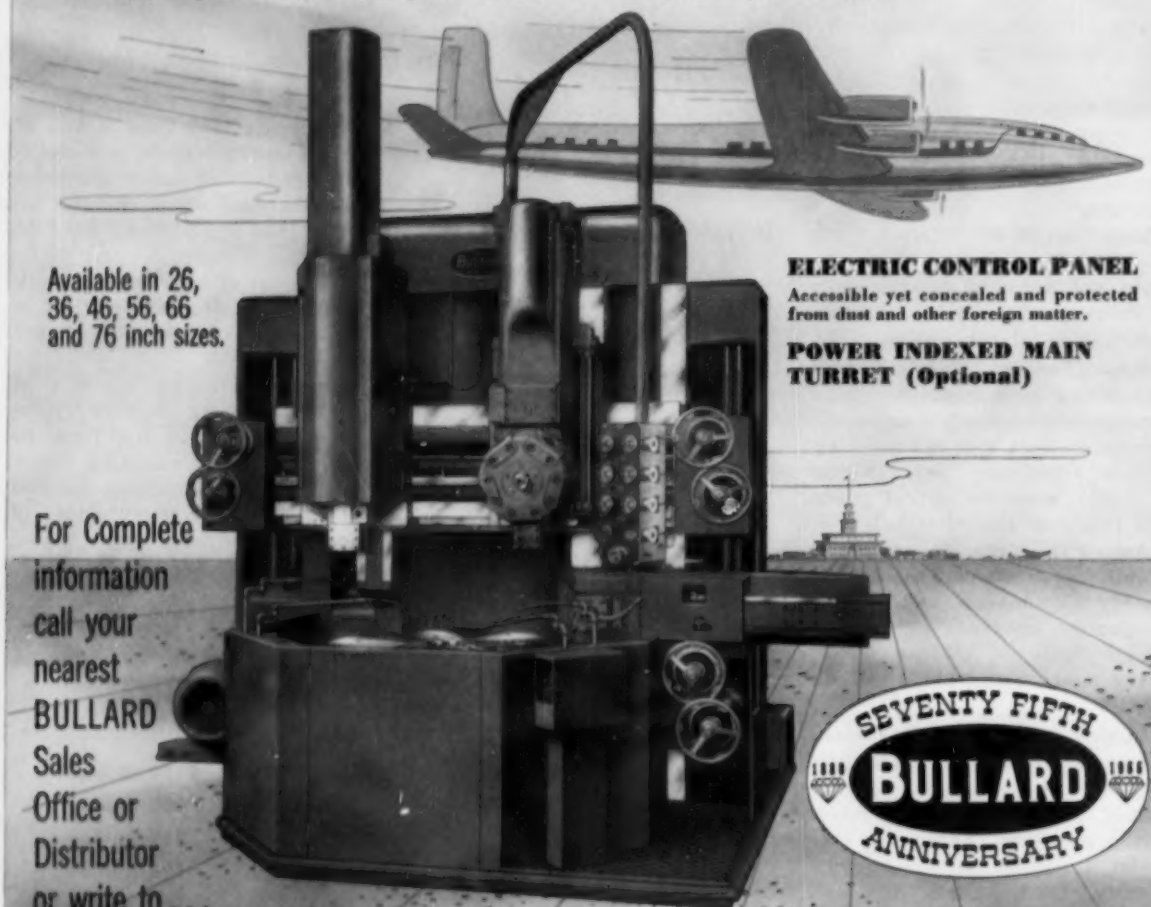

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The ubiquitous jeep: As a bulldozer

. . . as a lift truck

. . . as a trench digger

. . . as a scaffold support

Willys Bets on the Jeep Instead of the Auto

WILLYS, once second-largest auto producer in the nation, is edging out of the passenger car business.

Despite a history going back through the nostalgic days of Overland and Pope-Toledo, Willys figures the volume competition of the Big Three constitutes a road leading nowhere for it. On the assumption that the answer lies off the beaten track, the firm is turning to jeeps which have established their prowess.

Shift in Emphasis — Jeeps already are in the forefront of the Willys operations. Production of these ubiquitous vehicles is running about 1700 weekly, compared with only about 350 passenger cars and station wagons. While Willys' share of passenger car output is only about one-fifth of 1 per cent, its four-wheeled drive vehicles are garnering about 8 per cent of the truck total.

As Willys moves through what apparently will be its last year of passenger car production, there are evidences of loose ends being tied up. The already-started facilities integration program in Toledo, O., will be carried through to completion; that, in turn, will result in the disposition of a number of other plants.

For Sale—The foundry in Pontiac is closed and up for sale. The Dowagiac, Mich., plant is to be sold. The Maywood, Calif., plant has been sold, and the Anderson, Ind., plant is being sold. The Detroit Engine Division, and much of

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its production equipment, is being moved to Toledo, and that plant in Detroit will be sold. The lease of Erie Aluminum Forge is assumed by Kaiser Aluminum and the Shadyside, O., stamping plant is operating on a commercial basis.

But perhaps of greater importance is the integration of the dealer organization which may well be responsible for the continuation of the passenger car production this year. Most of the Kaiser and Willys dealers have been passenger car agents for many years. They are being asked to shift over to the Jeep, and a different type of merchandising. One of the Willys' biggest jobs is the selling of dealers on the jeep.

More Dealers—Spokesmen report considerable dealer enthusiasm. They have increased over 500 since last July to a current total of 2436. This compares with about 3000 to 3500 for the other two of the Little Three. Also under way is a move to get dealers handling other makes of cars to take on the jeep as a second line. Viewed by Willys as a vehicle not competitive with passenger cars, the plan would have jeeps and jeep service dotting the rural areas like Burma Shave signs. Of course, the filling station without a jeep in urban areas is tending to become an oddity.

Certainly on the score of its uniqueness, the jeep has a solid wedge, and it is upon this that Willys proposes to capitalize. Many of the design features of these four-wheeled drive vehicles are covered by patents. Their applications mount with every mail received at Toledo. At last count, 38 major attachments were available to equip the jeep for special jobs, and some are remarkable.

Case in Point — For example, there's a trenching attachment which fits onto the back of the jeep. Under some circumstances, it is possible for the operator to start the jeep, tie the steering wheel and go over under a tree to rest. The jeep can dig up to 800 feet an hour. When the job is completed, a special blade can be used to fill in the trench.

Other gimmicks include: Hydraulically operated blades, scoops and hoists of several descriptions, post hole drilling attachments, reel-type and rotary lawn mowers, winches and complete conversion to a fork-lift truck. The power take-off at the rear permits the vehicle to be used in operating a host of other commercially available items, such as buzz saws, corn shellers, pulverizers, etc. And, of course, its uses in pulling are limited only by the imagination.

Idea Processing — Ideas that come in are carefully screened by Willys' engineers. The firm makes none of the attachments itself, but subjects each to rigorous investigation. If the device proves itself to the satisfaction of the scrutineers, it is cataloged, and its availability is made known to dealers. This, the firm feels, offers distinct advantages over a development program, which would have to go outward in all directions. It also would entail inventory and manufacturing problems.

The basic beauty of the jeep, however, is, and will continue to be, its four-wheel-drive feature. Willys is interested to hear that through rigging up an eccentric on the power take-off, a pecan grower has developed a first-class nut shaker; that an Ohio man has developed a portable scaffold and paint spray setup for his jeep. But the firm feels that it is selling a basic, four-wheeled-drive vehicle which because of its underlying design can be equipped by so many people to do so many jobs.

New Start—To some who remember the firm in receivership back in the thirties, the word that Willys probably will drop passenger car production at the end of this year may be viewed as the beginning of the end. But Willys people certainly don't feel that way. They comment glowingly on the potential they feel is ahead for the jeep and the company.

The new philosophy of the firm appears to hinge upon the development of a new, uncontested area of vehicle production. Not even the truckmakers compete with Willys, which makes something only approximately classified as a truck. The firm feels that only the surface has been scratched in selling these vehicles to the myriad of filling stations, plants, farmers and small businessmen who can find them useful.

Gold Mine?—"We've had a gold mine under our noses all along and never realized it," comments one official. His observation apparently is typical of the feeling in Toledo and among many of the dealers who find themselves with a vehicle to sell that is unique.

Getting those differences across through demonstration of the many attachments is being accomplished at sales training schools. They are building up a sales force which finds real rather than imaginary virtues — an interesting switch in the motor vehicle business. Many salesmen come away almost too enthusiastic about prospects. "You can't sell people a vehicle by saying that it will do everything," comments an older and wiser head.

But deep down inside officials at Willys wonder if it won't.

Auto, Truck Output

U. S. and Canada

	1955	1954
January	780,780	594,467
February	770,528	574,215
March	955,014†	672,858
April		676,248
May		621,262
June		623,732
July		543,540
August		523,799
September		364,441
October		312,078
November		616,395
December		761,954
Total		6,884,989

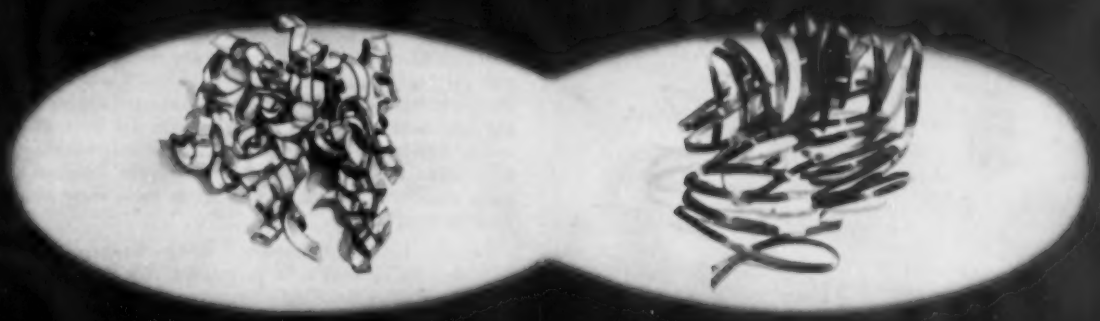
Week Ended	1955	1954
Mar. 12	203,149	143,478
Mar. 19	212,776	154,895
Mar. 26	217,347	149,586
Apr. 2	218,437	146,498
Apr. 9	207,107†	152,086
Apr. 16	205,000*	148,559

Source: Ward's Automotive Reports. †Preliminary. *Estimated by STEEL.

Shippers Use Trailer Pool

Shippers dispatched more than 2 million tons of freight in four months on trailers drawn from a new pool. Established last November, National Trailer Pool Inc., Minneapolis, has 1600 trailers under lease to members. Charter members operate in 17 states and have nationwide interchange agreements with other truck lines.

When the Chips are down



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Silmo	Sicromo 3	Sicromo 9M	25-12*
DM	4-6% Cr.-Mo.	18-8 Stainless	35-15**
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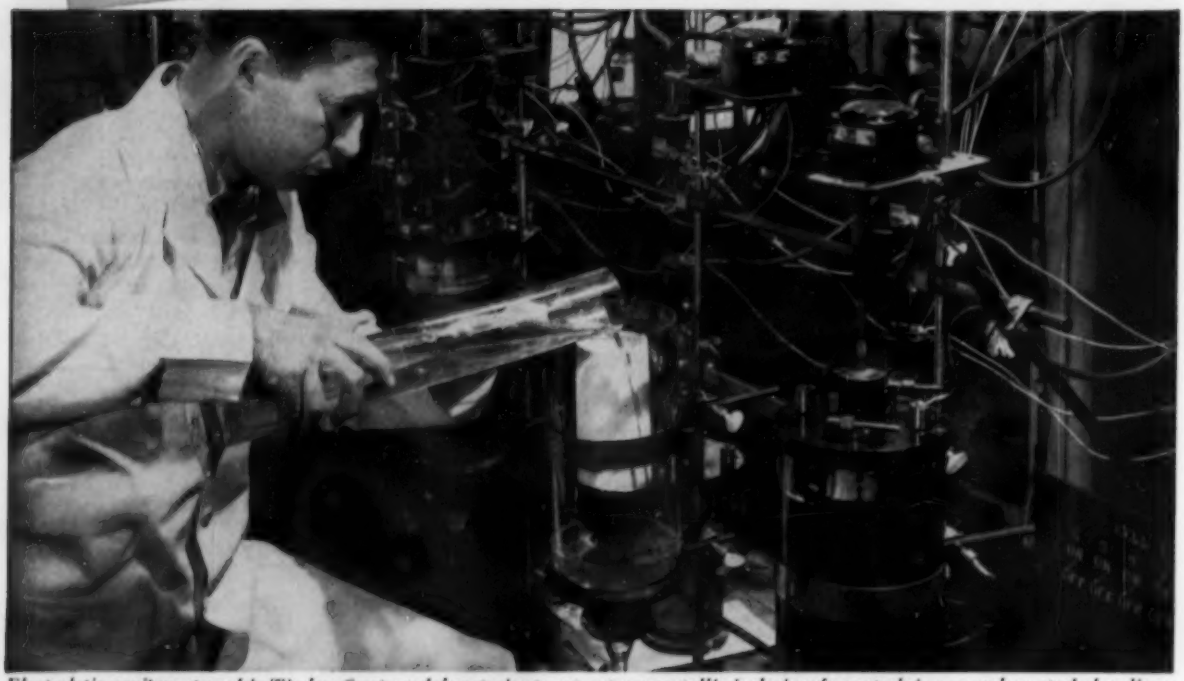
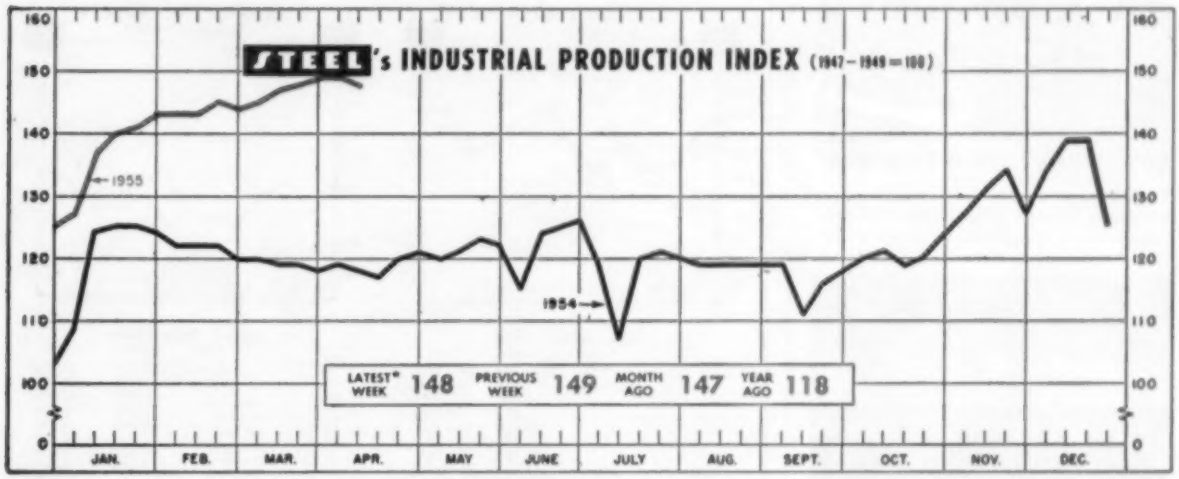


Electrolytic equipment used in Timken Company laboratories to extract non-metallic inclusions from steels in research on steel cleanliness

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



*Week ended Apr. 9. Based upon and weighted as follows: Steel Output 35%; Electric Power Output 32%; Freight Car Loadings 22%; and Auto Assemblies 11%.

Rising Production Signals Higher Profits Ahead

PROFITS are looking up, with production gains pointing the way—especially in industries that saw both output and profits fade in recession-hit 1954.

The trend started in the final quarter of last year. That strong surge, plus the end of excess profits tax, combined to push net income of many firms above levels of boom 1953. "It was the most prosperous recession we ever had," quip a number of executives now that the slump is over.

Income Up—Of some 3500 firms checked by First National City Bank of New York, 56 per cent reported higher net incomes in 1954 than in 1953. For all firms, the gain was 4 per cent.

Pretax earnings for all firms dropped 10 per cent, mainly because of a 5-per-cent dip in sales. But the net profit margin was up to an average 6.1 per cent, against 5.6 per cent in 1953, reflecting the tax cut.

Aircraft Gains — Metalworking on the whole did as well as the average, but within the industry there were wide swings. For example, the aircraft industry showed net income up 54 per cent over 1953. On the other hand, producers of railway equipment saw their net fall about 18 per cent.

Segments of metalworking that did well were instruments, up 35 per cent; autos and trucks (in spite of lower production and a poor year for several producers), up 17 per cent; electrical equipment, radio and television, up 13 per cent.

Some Slides—Recording lower net incomes were auto parts, down 16 per cent; iron and steel, down 14 per cent (STEEL, Apr. 11, facing p. 104); hardware and tools were off 12 per cent. Agricultural implements fell 11 per cent.

Some lines that did fairly well saleswise didn't make out so well along profit lines. In household appliances, sales were off about 5 per cent; profits were off 6 per

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,292	2,300	1,622
Electric Power Distributed (million kw-hr)	9,775[1]	9,804	8,396
Bitum. Coal Output (1000 tons)	7,360	7,900	6,032
Petroleum Production (daily avg—1000 bbl)	6,846[1]	6,807	6,568
Construction Volume (*ENR*—millions)	$335.0	$335.8	$314.3
Automobile, Truck Output (*Ward's*—units)	207,107	218,437	152,086
TRADE			
Freight Car Loadings (1000 cars)	663[1]	659	607
Business Failures (Dun & Bradstreet, no.)	225[1]	237	246
Currency in Circulation (millions)[3]	$29,900	$29,738	$29,795
Dept. Store Sales (changes from year ago)[3]	+11%	+3%	−13%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$20,159	$18,257	$18,722
Federal Gross Debt (billions)	$227.1	$274.2	$270.0
Bond Volume, NYSE (millions)	$14.1	$14.9	$17.2
Stocks Sales, NYSE (thousands of shares)	9,432	14,082	10,330
Loans and Investments (billions)[4]	$83.5	$84.0	$78.1
U. S. Govt. Obligations Held (billions)[4]	$32.9	$33.5	$30.9
PRICES			
STEEL's Finished Steel Price Index[5]	194.53	194.53	189.74
STEEL's Nonferrous Metal Price Index[6]	237.1	235.9	211.9
All Commodities[7]	110.3	110.5	110.9
Commodities Other Than Farm & Foods[7]	115.6	115.5	114.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1955, 2,413,278. 1954, 2,384,549. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

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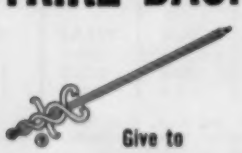

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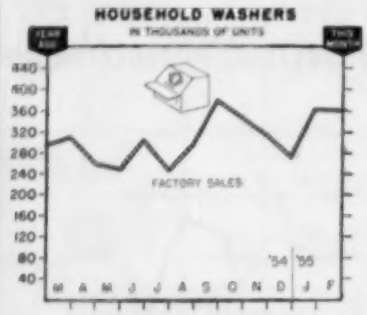
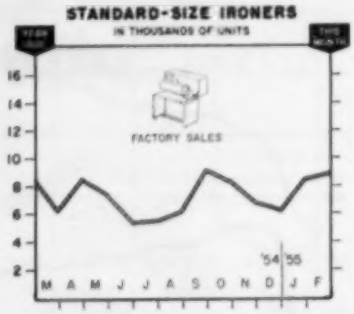




Sales Billed—Units

	1955	1954	1953
Jan.	357,354	249,956	277,309
Feb.	353,214	295,171	326,604
Mar.	.....	307,862	345,989
Apr.	.....	298,712	288,474
May	.....	246,944	286,515
June	.....	303,456	304,086
July	.....	242,863	228,268
Aug.	.....	293,243	291,260
Sept.	.....	379,666	340,532
Oct.	.....	339,169	310,867
Nov.	.....	308,368	238,153
Dec.	.....	284,803	191,570
Totals	.....	3,490,212	3,429,627

American Home Laundry Mfrs. Assn.

Factory Sales—Units

	1955	1954	1953
Jan.	8,241	9,792	24,395
Feb.	8,648	8,208	22,586
Mar.	.....	6,025	16,066
Apr.	.....	8,388	14,060
May	.....	7,210	9,323
June	.....	5,185	12,529
July	.....	5,227	9,626
Aug.	.....	5,925	8,067
Sept.	.....	8,905	9,113
Oct.	.....	9,021	11,666
Nov.	.....	6,427	10,105
Dec.	.....	5,892	6,908
Totals	.....	86,205	154,464

American Home Laundry Mfrs. Assn.

Charts Copyright 1955 STEEL.

cent in spite of the end of excess profits tax. Tight competition, with resulting pressure on prices, probably caused the drop.

Continuing heavy capital expenditures increased the net worth of the surveyed firms by $9 billion, to $140 billion. Metalworking kept pace with an equal percentage gain. Return on book net assets for all manufacturing was 12.4 per cent, or slightly lower than 12.7 per cent in 1953. Metalworking did a little better in this respect, with 12.8 per cent in 1954, against 13.1 per cent in 1953.

Employment Climbs Again . . .

Another business indicator that's rising is employment. Widespread gains in factory employment continued in March, says the Labor department. Spring revival of outdoor activities, like construction and agriculture, are also under way.

Civilian employment over the month rose a half million to 60.5 million; unemployment dropped by 200,000 to 3.2 million. (The difference in the increase in employment and the smaller fall in unemployment is caused by farm women and young persons entering the labor market.)

Unemployment is down a half million from the high of last March.

Work Week Lengthens . . .

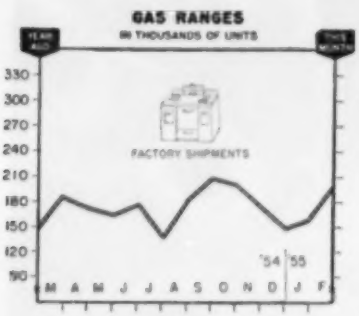
Durable goods industries led the way in the upturn in factory employment. Sparking the gains were primary and fabricated metals and the auto industry. Nondurable goods industries registered substantially more than just seasonal gains for the first time in more than two years.

A good indicator of improved business is the factory work week, now at 40.7 hours. That's a rise of 1.2 hours over a year ago, and the highest since mid-1953.

Sixteen of the twenty-one major industry groups report an average work week of over 40 hours, giving an idea of the spread of overtime.

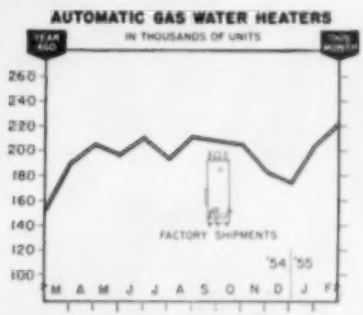
Building Goes Up . . .

Construction contracts continue at a dizzy pace. F. W. Dodge Corp. reports a March total of $2135 million, up 40 per cent above that month of 1954 and the second highest all-time total for one month. The only higher month, May, 1951, benefited from



Shipments—Units	1955	1954	1953
Jan.	156,100*	137,000	169,200
Feb.	193,900*	152,900	185,900
Mar.		188,200	208,200
Apr.		172,400	220,300
May		163,800	181,000
June		174,300	166,600
July		134,500	158,000
Aug.		179,400	186,800
Sept.		203,900	200,500
Oct.		197,100	203,900
Nov.		174,000	158,500
Dec.		147,300*	134,400
Total		2,024,800	2,183,300

Gas Appliance Mfrs. Assn.
*Preliminary.



Shipments—Units	1955	1954	1953
Jan.	200,000*	164,400	189,900
Feb.	218,500*	175,000	194,200
Mar.		187,800	207,400
Apr.		200,800	209,500
May		195,600	183,300
June		206,700	181,200
July		190,300	178,900
Aug.		207,100	168,100
Sept.		205,500	179,000
Oct.		202,000	194,300
Nov.		179,100	155,000
Dec.		166,800	141,900
Total		2,281,100	2,182,700

Gas Appliance Mfrs. Assn.
*Preliminary.

large contracts for atomic energy plants.

Says Thomas S. Holden, Dodge vice chairman: "When you consider that records were broken month after month through the winter, plus March, it becomes virtually certain that construction will continue at a high rate of activity well into or through the summer. . . . However, while current records are rather spectacular . . . they do not appear to be out of line with the current of our fast growing economy.

"Even more significant than the March figures alone is the fact that our total for the first quarter ($5220 million) was 34 per cent ahead of the first quarter of 1954, the previous high."

Appliances Get Hot . . .

Appliance makers also are chalking up big sales—at least if they are in the trend reported by some major producers. For example, Gwilym A. Price, president, Westinghouse Electric Corp., says that to date this year sales of major appliances are up 12 per cent over 1954. Demand is so great that back ordering is necessary on some models.

Harlow H. Curtice, president, General Motors Corp., puts sales of Frigidaire major appliances during the first quarter at more than 25 per cent greater than the same period last year. "This trend is expected to continue and should result in a 25-per-cent increase for the entire year, making this an outstanding year for household appliances."

Trends Fore and Aft . . .

Ford dealers are "selling everything the division's 16 assembly plants can produce and are asking for still more units to build up their inventories for the heavy spring-summer selling season," says L. W. Smead, general sales manager. First-quarter output set an all-time record . . .GM's latest figures also show record first-quarter sales, and demand remains strong . . . Production of both radio and TV sets is up from both January and the year-ago month, reports the Radio-Electronics-Television Manufacturers Association . . . Net income of 126 Class I railroads in February was $46 million, just double the sum for the same month in 1954 . . . National Coal Association reports coal production at 12.4 per cent over a year ago.

for exacting standards only

Not one strip rolling requirement in ten need be carefully "miked" to assure close width tolerance.

But that exceptional job is routine with Somers THIN STRIP. Monel, pure Nickel and Nickel alloys are rolled to within ±5% from .010" to .00075", with the same degree of accuracy in widths, and with the exact properties required by your product.

Modern rolling, annealing and precision control equipment assure uniform high quality under the most rigid specifications.

And Somers 40 years experience in a wide range of applications is available to help solve your strip problem without obligation.

Write for confidential data blank or field engineer.

FOR EXACTING STANDARDS ONLY
Somers

Somers Brass Company, Inc.
WATERBURY, CONN.

Fewer tools, lower costs, no rejects ...with Tinnerman SPEED NUTS!

A change to Tinnerman SPEED NUT brand fasteners can eliminate production problems in addition to saving important assembly dollars! Here's proof. The Peterson Manufacturing Company, Kansas City, Missouri, formerly assembled its Combination Stop and Tail Lamp with four stamped and tapped brackets. Costly equipment was necessary to manufacture the brackets, and misalignment of holes often made assembly difficult. Damage to units on the assembly line averaged 5%!

Four SPEED NUTS have changed everything! Material costs have been cut a whopping 60%! The tools to manufacture the brackets are eliminated. The easy lead-in provided for screws by the SPEED NUT impression cuts assembly time 20%, increases production by 15%. Misalignment of holes presents no problem for SPEED NUTS and assembly-line damage is completely eliminated!

Let Tinnerman help with your fastening problems. Ask your Tinnerman representative or write for complete details on our Fastening Analysis Service.

TINNERMAN PRODUCTS, INC. • BOX 6688, DEPT. 12, CLEVELAND 1, OHIO

Canada: Dominion Fasteners, Limited, Hamilton, Ontario. *Great Britain:* Simmonds Aerocessories, Limited, Treforest, Wales. *France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine). *Germany:* Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

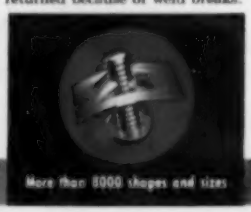
TINNERMAN Speed Nuts® FASTEST THING IN FASTENINGS

TYPICAL USES

"U" type SPEED NUTS cut assembly costs, maintenance on farm equipment.

Special SPEED NUT eliminated production problems on washing machine motor mount bracket.

SPEED GRIPS eliminated costly repairing of truck radiators returned because of weld breaks.



EDWIN R. BRODEN
. . . SKF Industries exec. v. p.

Edwin R. Broden, effective May 1, will be executive vice president of **SKF Industries Inc.,** Philadelphia. He has been executive vice president and a director of Carborundum Co., which he joined in 1944 as vice president-operations.

Heppenstall Co., Pittsburgh, named **J. O. Phillips** assistant to the executive vice president-sales, and **George H. Wurster** manager of forging and die steel sales.

Charles E. Beaver, general sales manager, was elected a vice president of **Research-Cottrell Inc.,** New York. **S. E. Specht** was made assistant sales manager.

Joseph W. Tinaglia was made works manager, **Franke Gear Works Inc.,** Chicago.

Jackson D. Allen was made manager and **Norbert E. Willkomm** sales manager at **Hamilton Steel Warehouse,** Cleveland, recently purchased by Jones & Laughlin Steel Corp.

B. A. Miller was named production control manager of **Charter Wire Inc.,** Milwaukee. He resigned as assistant purchasing agent of Ladish Co.

Arthur G. Tichenor was named manager of manufacturing, industrial products division, **Westinghouse Electric Corp.,** Pittsburgh.

FRANK LOFTHUS
. . . Wisconsin Motor p. a.

Frank Lofthus was promoted to purchasing agent, **Wisconsin Motor Corp.,** Milwaukee. He has been in purchasing for the company since 1939.

Sheller L. Steinwender was made vice president, **Permutit Co.,** New York. He was vice president, Scaife Co., and prior to that was with A. O. Smith Corp. and American Cyanamid Co.

Theodore W. Chase was made manager, coupling department, metal products division, **Koppers Co. Inc.,** at Baltimore.

Julius J. Kirchhof, executive vice president, was elected president of **Franklin Balmar Corp.,** Baltimore. He succeeds **John N. Merkle,** now vice chairman of the board.

Karl Adler was elected vice president-sales and a director of **Dumas Steel Corp.,** Pittsburgh, and subsidiaries. He was general sales manager.

Manning, Maxwell & Moore Inc., Stratford, Conn., elected **J. Robert Kelley** executive vice president; **Chester H. Butterfield** vice president-operations; and **Charles A. Moore** vice president-treasurer.

John Dewey was named Chicago branch sales manager, **Warner Electric Brake & Clutch Co.,** Beloit, Wis.

L. K. STRINGHAM
. . . Lincoln Electric v. p.-engineering

L. K. Stringham was elected vice president - engineering, **Lincoln Electric Co.,** Cleveland. He was chief engineer. **George Landis,** former engineering vice president, was appointed vice president in charge of research.

Link-Belt Co. appointed **Dwight H. Renfrew** chief engineer and **William A. Morley** general superintendent of its plant at Philadelphia.

Clare F. Saltz was made manager of the ordnance equipment division of **U. S. Hoffman Machinery Corp.,** New York.

Lynn G. White was made sales manager, **Toolset Division,** General Riveters Inc., Buffalo. He was office manager, co-ordinating sales and engineering.

W. D. Bryson was named manager of **International Harvester Co.'s** manufacturing research operations, Chicago. He replaces **J. W. Armour,** retired. **Menno Felber** succeeds **R. E. Bloye** as assistant manager of manufacturing in the industrial power division. Mr. Bloye was made manufacturing manager of the company's French subsidiary. **Harry A. Torgeson** succeeds Mr. Felber as manager of the Tractor Works in Chicago.

Harry T. Burke was made chief engineer of **E. W. Bliss Co.'s** Hastings Division, Hastings, Mich. He

R. F. WILLETT
. . . gen. mgr. of Empire Coil

has been assistant to the chief engineer since 1949.

R. F. Willett was made general manager, **Empire Coil Co. Inc.**, New Rochelle, N. Y. He has been plant manager at Essex Electronics for the last three years.

Ernest C. Hartmann and **Dr. Philip T. Stroup** were made assistant directors of research at **Aluminum Co. of America's** Aluminum Research Laboratories, New Kensington, Pa. **Harry N. Hill** succeeds Mr. Hartmann as chief of the engineering design division, and **Dr. Allen S. Russell** replaces Dr. Stroup as chief of the process metallurgy division. **Dr. Luther M. Foster** is successor to Dr. Russell as chief of the physical chemistry division.

Trane Co., La Crosse, Wis., elected as executive vice presidents **R. James Trane**, who is also president of the subsidiary, Trane Co. of Canada Ltd.; **Wayne J. Hood**, who was vice president-treasurer; and **Thomas J. Hancock**, who was vice president-sales. **Richard H. Pearse, Sr.**, purchasing agent, was elected vice president.

Robert W. Stoddard was made president, **Wyman-Gordon Co.**, Worcester, Mass. **Harry G. Stoddard**, president since 1931, becomes chairman of the board. **George F. Fuller** was made honorary board chairman. **Sacket R. Duryee**, treasurer, also was made vice president.

SAMUEL C. McDOWELL
. . . Pressed Steel Division mgr.

Frederick R. Schaefer has retired as general manager, **Pressed Steel Division**, Republic Steel Corp., Cleveland. **Samuel C. McDowell** was appointed division manager; **Theodore G. Humphrey**, container sales manager; and **Frank F. Malcher**, pressed steel sales manager.

Dallas M. Marsh was made assistant foundry superintendent, **Cooper-Bessemer Corp.**, Mt. Vernon, O.

C. I. Young was named vice president and general manager, **Laclede-Christy Division**, H. K. Porter Company Inc., at St. Louis. Mr. Young was vice president in charge of operations at all Laclede-Christy plants.

C. I. YOUNG
. . . Laclede-Christy v. p.-gen. mgr.

C. J. ROWLES
. . . Euclid Electric exec. v. p.

Euclid Electric & Mfg. Co., Madison, O., elected **C. J. Rowles** executive vice president and a director. Mr. Rowles has been vice president-sales.

At **Cadillac Motor Car Division**, General Motors Corp., Detroit, **W. D. Millington** was made superintendent of methods and equipment division.

William L. Walsh was made assistant to the president of **Kennecott Copper Corp.**, New York. His duties will be in the field of the corporation's titanium interests. He was with General Aniline & Film Corp., his most recent position manager of manufacturing.

W. Ray Miller was appointed manager, quality control department, **Jeffrey Mfg. Co.**, Columbus, O. He is replaced as field erection manager by **Harold Simpson.**

In the Philadelphia plant of **International Resistance Co.**, **Leo J. Jacobson** was made chief engineer; **George Williams** group leader, product engineering; **Benjamin F. Gerding** manager, manufacturing engineering; and **Carl Smith** manager, quality control.

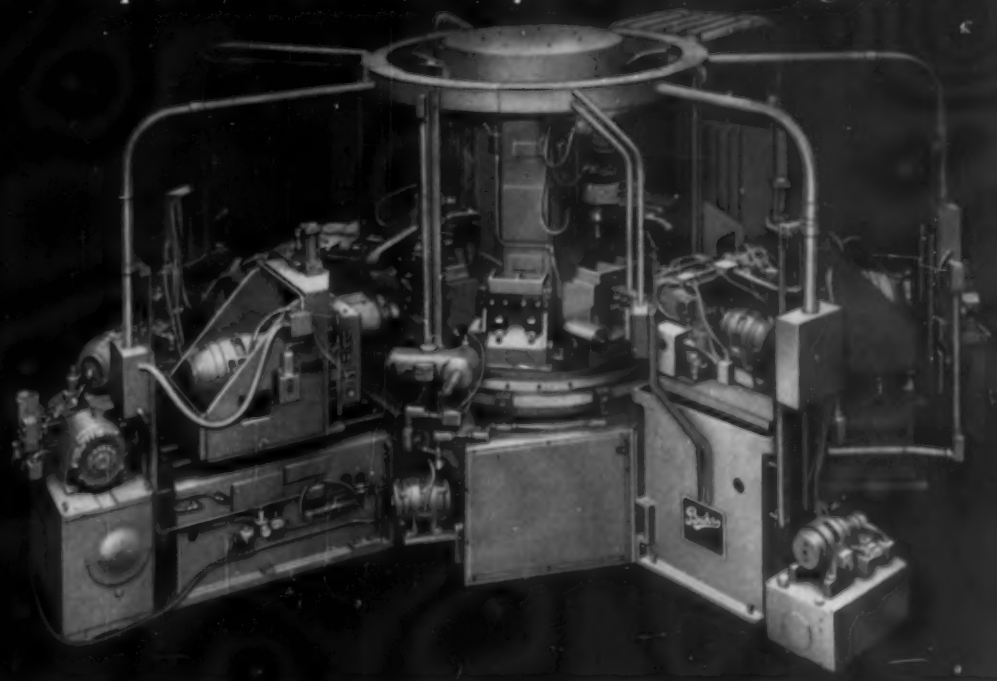
Dean Barton was appointed chief production engineer of **Helipot Corp.**, South Pasadena, Calif.

Chandler G. Lewis was made assistant general manager of **Wheeling Steel Corp.'s** Martins Ferry, O., factory. **Carl D. Burkland** was

ANOTHER EXAMPLE of
REDUCING COSTS WITH—

Buhr ECONOMATION

Mills, core-drills, drills, semi-finish bores, chamfers and taps 288 master-brake cylinders an hour gross!



Rough castings are loaded in pairs in this 10-way 7-station hydraulic-feed center-column Machine.

Equipped with 72"-diameter 7-position automatic power-driven heavy-duty index table, complete with two shot bolts.

For extreme ease of servicing and maintenance, automatic indexing unit slides out *without removing table.* This is done simply by detaching cover on front of Machine.

Other features of Machine include automatic hold-down clamp at rough-and-finish milling station, automatic rotating chip conveyor, power clamping and automatic lubrication.

Buhr
MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

Let us show you how Buhr Economation can reduce your production costs. A phone call, wire or letter will bring you a prompt consultation with one of our top sales executives.

BUHR MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

Solidly Engineered • Precision Built • for World's Leading Manufacturers

JOHN R. HOWELL
. . . Sterling Electric v. p.-sales

H. GEORGE DE YOUNG
. . . exec. v. p., Atlas Steels Ltd.

A. R. KAPLAN
. . . president of Owatonna Co.

promoted to chief industrial engineer at Wheeling, W. Va.

John R. Howell was appointed vice president-sales, **Sterling Electric Motors Inc.**, Los Angeles. He has been sales manager.

A. J. Van Harn was appointed general manager, **Grindle Corp.**, Harvey, Ill. He also was named to fill the vacancy on the board created by the death of **A. J. Grindle**, president. **J. H. Gougler**, executive vice president, will head the engineering department and **L. W. Olsen** will be in charge of purchasing and estimating.

Douglas A. Hopper was named general manager of **General Electric Co.'s** welding department at York, Pa. He succeeds **Raymond C. Freeman**, appointed manager of engineering and operations, atomic power equipment department, at Schenectady, N. Y. **Harold A. Olson** was elected a commercial vice president of GE, responsible for customer relation activities in the New York territory.

H. George De Young was elected executive vice president of **Atlas Steels Ltd.**, Welland, Ont. After joining Atlas in 1951 as works manager, Mr. De Young was successively named vice president-operations and appointed to the board of directors.

H. L. Stockdale was made president of **Insul-Mastic Corp. of America**, Pittsburgh. He succeeds **Clifford Off.** Mr. Stockdale will move his executive and sales offices from Pittsburgh to the plant office building at Summit, Ill., by Apr. 22.

Edgar W. Husemann, former assistant chief metallurgist, was named chief metallurgist of **Copperweld Steel Co.**, Warren, O. He assumes direction of the metallurgical department and will report to the general superintendent and his staff and to the sales manager on customer problems. **William J. Buechling**, former chief metallurgist, was appointed one of the assistant general superintendents of Copperweld.

Owatonna Tool Co., Owatonna, Minn., elected **A. R. Kaplan** president to succeed **R. A. Kaplan**, now chairman of the board. **R. W. Kaplan** leaves Truth Tool Co., Mankato, Minn., to become executive vice president. **R. E. Schuster**, time study and methods engineer, replaces Mr. Kaplan at Truth Tool as general manager. In addition, **D. J. Kaplan** moves from production manager to engineering vice president; **C. P. Kaplan** from purchasing agent to secretary; **R. R. Barnard** from secretary to treasurer and comptroller. **Robert Allyn** was made sales manager and **J. A. Mullenmaster** industrial sales manager.

Revere Copper & Brass Inc., appointed **E. Ross Houston** district manager of its newly enlarged Minneapolis sales district.

Newly elected vice presidents of **Reynolds Metals Co.**, Richmond, Va., are **C. E. Coghill**, treasurer; **John Krey**, assistant to the president; and **W. Monroe Wells**, assistant vice president-operations.

OBITUARIES...

George H. Woody, 52, sales manager in Indianapolis for the Dodge plant of **Link-Belt Co.**, died Apr. 2.

John M. Ellis, 73, retired assistant to vice president, sales department, **Bethlehem Steel Co.**, Bethlehem, Pa., died Apr. 3. He served as general manager of sales for many years.

W. A. Roberts, 57, president since February, 1951, of **Allis-Chalmers Mfg. Co.**, Milwaukee, died Apr. 12.

Henry S. Washburn, 69, chairman of **Plainville Casting Co.**, Plainville, Conn., died Mar. 31.

Daniel J. Finucane, 61, manager of the New York sales district of **Revere Copper & Brass Inc.**, died Apr. 3.

Andrew J. Snow, manager of sales, Washington district sales office, **United States Steel Corp.**, died Apr. 7. He had been with the corporation since 1910.

A Claymont steel plate being swung into place during the construction of new-type prefabricated all-steel dock at the plant of The Pusey and Jones Corporation, Wilmington, Del. This steel pier is 460 feet long and weighs 1300 tons. Twelve hundred tons of Claymont steel went into its construction.

New prefabricated all-steel dock uses CLAYMONT STEEL PLATES *throughout*

The only all-steel pier-type dock of its kind in the United States, this prefabricated giant was built by Pusey and Jones Corporation at its plant in Wilmington, Del. Launched in two sections from the Pusey and Jones plant, it was towed down Delaware Bay, and up the coast to New York Harbor for installation at the Astoria, L. I. generating station of the Consolidated Edison Co. It supports a coal unloading tower with an 850-ton per hour capacity.

Built of Claymont steel plates throughout, this type of prefabricated steel pier has important advantages over other types of construction. Many months of costly construction time are saved. Fabrication costs are considerably less than concrete construction. Installation is quick and easy. Years of trouble-free service are assured.

This is a patented engineering achievement of a specialized nature. But the concept of *prefabricated all-steel construction* may well be adaptable to other industrial applications.

First of two sections of prefabricated all-steel pier being launched at Wilmington for towing to New York.

You'll find at Claymont the skills and facilities to translate pioneering design into advanced developments for industry. Whether your requirements are for carbon or alloy steel plates, stainless-clad plates or customized flame-cut shapes, Claymont can meet your needs.

Claymont Steel Products

CF&I

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

Abilene • Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Casper • Chicago • Denver • Detroit • El Paso • Ft. Worth • Houston • Lincoln (Neb.) Los Angeles • New Orleans • New York • Oakland • Odessa • Oklahoma City • Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Tulsa • Wichita
CANADIAN REPRESENTATIVES AT • Edmonton • Toronto • Vancouver • Winnipeg

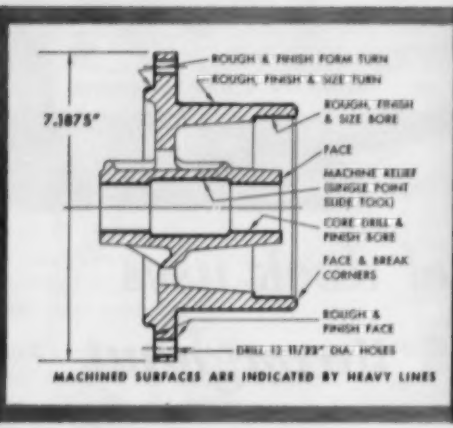
OTHER CLAYMONT PRODUCTS 2937

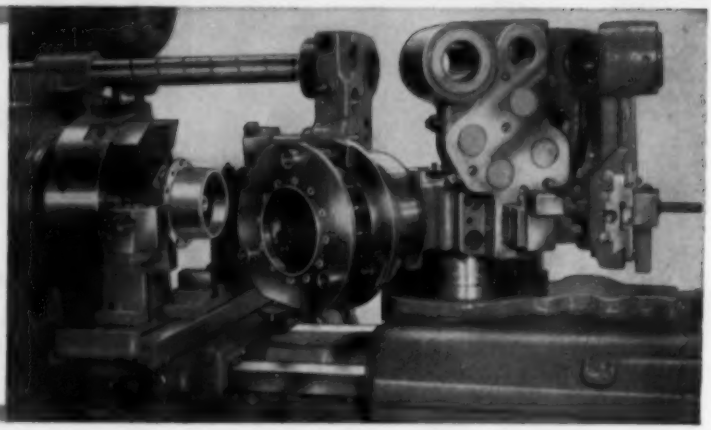
Stainless-Clad Plates • Manhole Fittings and Covers • Large Diameter Welded Steel Pipe
Flame Cut Steel Plate Shapes • Flanged and Dished Heads

P&J TOOLING

FEATURING A MULTIPLE SPINDLE DRILL HEAD and INSIDE CHUCKING

CUTS COSTS

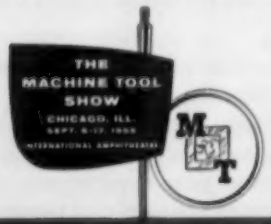

7.1875"
ROUGH & FINISH FORM TURN
ROUGH, FINISH & SIZE TURN
ROUGH, FINISH & SIZE BORE
FACE
MACHINE RELIEF (SINGLE POINT SLIDE TOOL)
CORE DRILL & FINISH BORE
FACE & BREAK CORNERS
ROUGH & FINISH FACE
DRILL 12 11/32" DIA. HOLES
MACHINED SURFACES ARE INDICATED BY HEAVY LINES



using a 5-DELX POWER-FLEX Automatic Turret Lathe

The cast iron bearing spider shown required machining of twenty separate surfaces, plus accurate drilling of twelve, 1⅛" dia. holes. A P & J Model 5-DELX POWER-FLEX performed all operations in a single, fully-automatic turret cycle . . . floor-to-floor time was just 7.96 minutes.

P & J Tooling Engineers estimated tooling and production costs from the piece drawings, and produced tools to take full advantage of the automatic speed and feed changes available in the Model 5-DELX. The result was high-quality production — with operator fatigue reduced and the number of machines per operator increased.



The Model 5-DELX POWER-FLEX — like all P & J Automatic Turret Lathes — provides the power, flexibility and automatic operation needed for sustained high-volume precision production.

Send today for Model 5-DELX Bulletin No. 131. If your production requires Automatics of smaller or larger capacity, you will find the right machine in the complete P & J line of Automatic Turret Lathes. Specific information on request.

PRATT & WHITNEY BRANCH OFFICES

BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., PAWTUCKET, RHODE ISLAND

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PAWTUCKET, RHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

PRECISION PRODUCTION TOOLING — FOR OVER FIFTY YEARS

Texas Foundries Expands

Project involves $1 million for steel foundry and additional working capital

TEXAS FOUNDRIES INC., Lufkin, Tex., is building a steel foundry which is expected to be in operation by the year end. The project will involve capital expenditures and additional working capital of $1 million.

Products will be carbon and alloy steel castings ranging in weight from a few pounds to a ton or more. They will be supplied chiefly to the petroleum industry as valve parts, couplings, hand wheels and miscellaneous oil field and pipeline specialties. In many instances, castings will be similar to the malleable ones now being produced. But they will be designed for greater tensile strength to resist higher pressures. Such castings are getting greater demand in the Southwest territory.

Equipment—Manufacturing facilities will include an electric melting furnace, several heat-treating ovens, sand slinger and jolt squeezer molding machines, overhead sand handling and sand reclaiming equipment. The foundry will have complete laboratory and quality control facilities and mechanized equipment for cleaning, handling, testing and inspecting castings to insure high quality and economical operations.

Initial production capacity will be 2400 tons of castings per year. Provision is being made for later expansion.

Most of the construction and installation work will be done under the direction of J. O. Klein, vice president and chief engineer, and Forrest Skoog, plant engineer. Col. C. C. Chambers is president and general manager of the organization.

Harlie M. Freeman has been employed as steel foundry superintendent. He formerly was foundry superintendent at High Bridge, N. J., for Taylor-Wharton Iron & Steel Co. R. S. Bradshaw Jr., vice president and production manager of Texas Foundries, will be in overall charge of operations of the Steel Foundry Division, with James R. Hewitt, director of customer relations, in charge of sales and customer service.

Many of the castings produced by the Steel Foundry Division, as well as castings being made by the Malleable Division, will be converted into finished and semifinished products by Luftex Machine Products Co. This is an affiliated company under the management of Garland Fariss and is owned jointly by Texas Foundries and certain members of the foundry management staff. Luftex has facilities for machining all types of ferrous castings and for processing and assembling several end-use specialties sold by Texas Foundries Inc.

Calstrip To Finish Expansion

Calstrip Steel Corp., Los Angeles, will complete its $500,000 expansion program by June, 1955. To be added are a cold-reducing strip mill, a roll grinder and a continuous annealing furnace.

Republic Builds Warehouse

Republic Steel Corp., Cleveland, is adding 112,000 sq ft of warehouse space to its Berger Division in Canton, O. Construction is expected to be completed in June.

Mueller Opens Warehouse

Mueller Brass Co., Port Huron, Mich., opened a new warehouse in St. Louis. It will stock copper and refrigeration tubes, valves, fittings and accessories. The St. Louis sales office has been moved to the new building.

Whirlpool Buys Plant

Whirlpool Corp., St. Joseph, Mich., bought a 250,000-sq-ft plant in Marion, O., from Motor Products Corp., Detroit. Pilot production of clothes dryers is expected this fall.

Westinghouse Ends Subsidiary

Westinghouse Electric Corp., Pittsburgh, dissolved its wholly owned subsidiary, Schneider Mfg. Corp., Muncie, Ind., to form the hydraulic drives department of the Westinghouse gearing division. The hydraulic drives department will sell, engineer and manufacture hydraulic torque converters and associated brakes and transmissions. The headquarters will remain in Muncie.

Northeastern Orders Furnaces

Northeastern Steel Co., Bridgeport, Conn., ordered two, 35-ton electric furnaces to bring its ingot capacity up to 300,000 tons annually. Products of the newly organized plant include hot-rolled carbon and alloy bars and narrow plates.

American Builds Brass Mill

Construction of a $13 million brass mill will begin soon in Paramount, Calif., near Los Angeles. Builder is American Brass Co., Waterbury, Conn., a subsidiary of Anaconda Copper Mining Co. Over 330,000 sq ft of floor space will be covered. The new mill will produce copper and copper-base alloys in the form of sheet, strip, rod, tubing and drawn copper products.

Furnace Boosts Capacity

A new continuous furnace ups annealing capacity for stainless wire 50 per cent at the New Brunswick, N. J., plant of Carpenter Steel Co.'s Webb Wire Division.

Uniform annealing to a predetermined tensile strength is permitted by furnace, which operates up to 2100° F. A nitrogen-hydrogen controlled atmosphere is used to give a bright finish.

Wire is drawn automatically through atmosphere-filled tubes by a take-up frame which keeps constant tension on the wire as it passes through the furnace.

American Hoist Expands

American Hoist & Derrick Co., St. Paul, merged with Thomas Laughlin Co., Portland, Me. The newly acquired plant will be operated as the Thomas Laughlin Division of American Hoist.

Federal Forms New Division

Federal Foundry Supply Co., Cleveland, formed a San-Blo Division for the production and sale

(*Please turn to page* 84)

BELOW, Petrochemical Plant Reactor Piping — Heavy wall, large diameter stainless pipe in 16 ft. lengths produced to the most stringent specifications in a variety of analyses, including the Extra Low Carbon grades.

UNITED STATES PIPE & FOUNDRY CO.

Special Products Division

SPECIAL PRODUCTS DIVISION USP

BURLINGTON, NEW JERSEY

SALES OFFICES: LOS ANGELES, SAN FRANCISCO, CHICAGO, ST. LOUIS, CLEVELAND, DETROIT, PITTSBURCH, HARTFORD, BURLINGTON

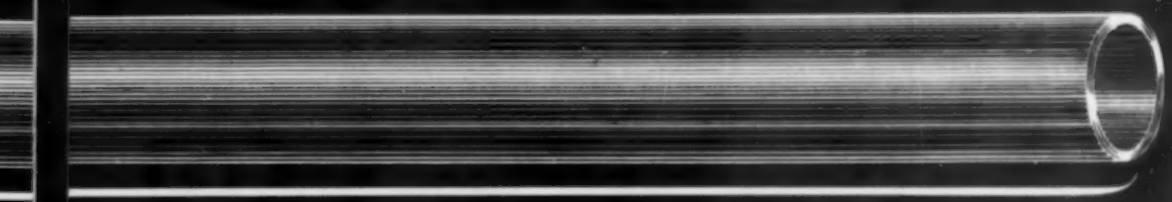
3 PROBLEMS
each different

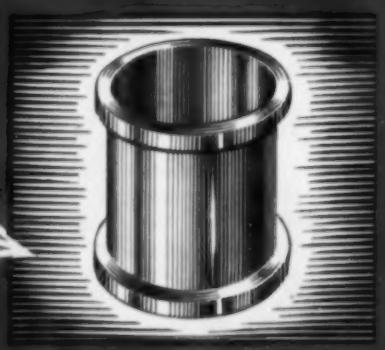
1 SOLUTION...
stainless steel
Centrifugal Castings

Hollow billets for cold reducing into small diameter seamless tubing, even down to hypodermic needles—ultimate proof of metal soundness! Many so-called non-pierceable grades of pipe and tubing can be hot or cold reduced from centrifugally cast billets.

Heavy Wall stainless steel pipe, centrifuge bowls, hollow billets for finely drawn hypodermic needle tubing . . .

These are among the many end uses for metal mold centrifugally cast cylindrical shapes. They are typical of the exacting, difficult service conditions to which this product is subjected. All three examples shown demonstrate the fundamental versatility of this manufacturing process—unequaled product soundness—from hypodermic needle stock subjected to the repeated stresses of cold reduction, to the centrifuge bowl spun





Centrifuge Bowl Shells processed from multiple length sections and machined to shape desired.

at 1800 RPM, to the petrochemical plant reactor piping that must pass hydrostatic pressure tests equal to 90% of the Yield Strength of the metal. These are the proving grounds of quality—of the ability to meet even the most exacting of product specifications.

We welcome your inquiries. For descriptive literature on the versatile metal mold process, write to United States Pipe and Foundry Company, Special Products Division, Burlington, N. J.

Study these advantages for your cylindrically-shaped products

- **Reduced processing time and increased production.**
- **Design of parts to suit the specific job requirements by selecting the correct alloy—not the next best available alternate.**
- **Conservation of expensive metals and alloys—especially on tubular parts now produced from solid sections.**

SIZE RANGE AND COMPOSITION FLEXIBILITY

Outside Diameter—4" to 36"

Wall Thickness—⅜" and up

Length—Up to 16' in the "as-cast" condition

Types of Stainless Cast—All Standard AISI and ACI grades of ferritic and austenitic stainless, including No. 20 Alloy, 17-4 P H, 17-7 P H and E.L.C. grades.

(*Concluded from page* 81)

of a line of core and mold blowing machines and allied foundry equipment. Division offices are in Cleveland; sales offices are in New York, Chicago, Detroit, Milwaukee and Los Angeles.

Globe Appoints Agent

Pickands Mather & Co., Cleveland, became exclusive sales agent for Globe Iron Co., Jackson, O., and its subsidiary, Globe Metallurgical Corp., Beverly, O. The Globe companies make silvery pig iron and a diversified line of ferroalloys.

National Lead Expands

National Lead Co., New York, acquired the Southern Screw Co., Statesville, N. C., through an exchange of stock. Southern Screw is a manufacturer of wood and metal screws.

Clark Builds Again

Clark Equipment Co.'s Construction Machinery Division at Benton Harbor, Mich., is building a 60,000-sq-ft addition to its recently completed, 150,000-sq-ft main plant. The addition will include machine shop facilities, storage space and offices.

Perfection Changes Name

Perfection Stove Co., Cleveland, changed its name to Perfection Industries Inc. Its products include furnaces, space heaters, water heaters, air conditioners, aircraft parts and military equipment.

Missile Starts Operation

Associated Missile Products Corp., new subsidiary of American Machine & Foundry Co., New York, will start operations in a 51,000-sq-ft plant in Pomona, Calif. The firm will design, develop and manufacture ground handling and checkout equipment for guided missiles.

Babcock & Wilcox Adds Lab

Babcock & Wilcox Co., Tubular Products Division, Beaver Falls, Pa., built a 29,000-sq-ft quality control laboratory. Equipment includes quantometers, x-ray diffraction units and a dilatometer.

Offers Nickel-Clad Plates

Colorado Fuel & Iron Corp., New York, signed an exclusive contract with Bart Mfg. Corp., Belleville, N. J., for nickel plating of CF&I steel-plate products. Bart will electroclad steel plate, steel mill plate shapes, flanged and dished heads. This new line of CF&I products will have outstanding resistance to contamination and corrosion, says H. C. Allington, vice president in charge of sales of CF&I's Eastern Division.

U. S. Steel Expands Plant

U. S. Steel Corp., Pittsburgh, is expanding its Gerrard Steel Strapping Division plant in Chicago. Facilities will be more than doubled with the addition of a 60,000-sq-ft building, which is scheduled for completion late this year. Gerrard produces steel strapping and strapping equipment.

Duff-Norton Buys Coffing

Duff-Norton Mfg. Co., Pittsburgh, changed its name to Duff-Norton Co. As part of its expansion program, it bought the Coffing Hoist Co., Danville, Ill. Coffing will be operated as the Coffing Hoist Division.

Yale Opens Plant in Canada

Yale Rubber Mfg. Co., Sandusky, Mich., will open a new plant in Kincardine, Ont., Canada. Operating as the Yale Rubber Mfg. Co. of Canada Ltd., it will start production in May.

Pittsburgh Adds Facilities

Pittsburgh Steel Co., Pittsburgh, added new coil annealing facilities at its works in Allenport, Pa. Two portable coil annealing furnaces and five bases were added.

Bridgeport Moves Plant

Bridgeport Thermostat Division, Robertshaw-Fulton Controls Co., Greensburg, Pa., will occupy a new, $2-million plant in Milford, Conn., in July. The new building, now be-

Bethlehem Steel Improves Nailmaking Facilities

Installation of a battery of 14, new-type nailmakers at Bethlehem Steel Co.'s plant at Sparrows Point, Md., has resulted in production of improved quality nails at about double the previous rate. The machines turn out 700 nails per minute in sizes from 1 to 2½-in. long, handling nail wire sizes from 15 to 10¼-gage. Delivery end of one of the nailmakers is shown above. Finished nails are carried from machine to nail buggy on a magnetic belt in inclined closure at right

17,032*

General Managers looking for BETTER METHODS!

Plan *now* to join them—at the Machine Tool Show. You'll find a wealth of answers to each of your metalworking problems. More than ninety per cent of the country's leading machine tool builders will be on hand, ready to show you their newest models, their fastest, most ingenious, most economical production methods.

It's the largest and most important show of its kind; one you can't afford to miss. The last time it was held, in 1947, all attendance records were broken—and this time even greater crowds are expected. The Production Engineering Show, being held on the Navy Pier, in Chicago, on the same dates, offers a bonus attraction that's hard to beat; a chance to see the latest in machine tool accessories at no additional cost. The same badge will admit you to both shows.

Bring your key production people to Chicago in September; share with them this unequaled opportunity to see the latest developments in machine tools. The 1955 Machine Tool Show is the best chance you've ever had to see **the world's best investment**—***in action!***

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION
2071 East 102 Street • Cleveland 6, Ohio

*** Estimated Attendance, Before Receiving Your Reservation**

USG PRODUCTS IMPROVE STEEL MAKING FROM CHARGE TO FINISHED INGOT

The United States Graphite Company has served the steel industry for a half century with products to improve steel making from the furnace to the finished ingot. Our engineering service and laboratories are constantly working on new products to solve your steel production problems. The products listed here are a few of the most popular and widely used — why not investigate them — they can cut your costs.

RECARB-X®

(engineering bulletin #11)

insures carbon specifications

RECARB-X is ideal for off-carbon heats. A fifty pound bag per 100-tons of steel will raise carbon two points when added to the ladle. RECARB-X dissolves quietly, gives uniform, dependable carbon recovery at all carbon levels. There are grades of RECARB-X for the furnace charge.

MEXICAN® MOLD WASHES

(engineering bulletin #15)

for better ingot surfaces

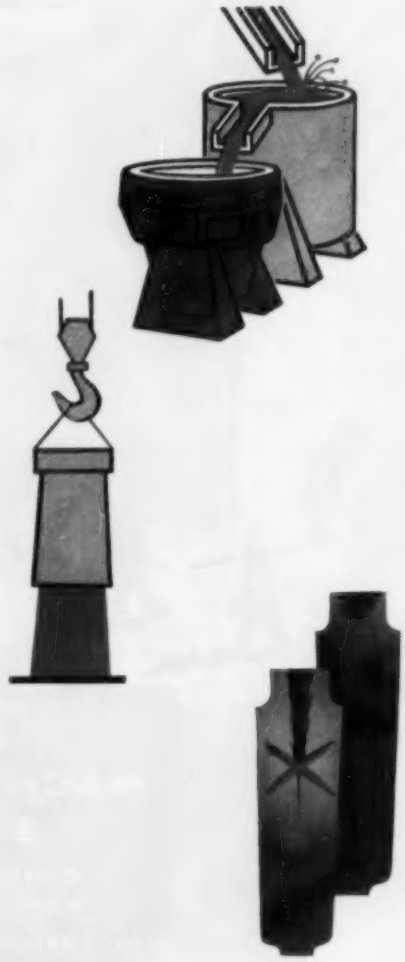
For as little as ¼c per ingot ton, you can insure quicker, easier mold stripping with MEXICAN Ingot Mold Washes. MEX and 90-B can be applied at any temperature and are easy to prepare and use. Where a high volatile "gas kick" is needed, VOLMEX or XF-81 will supply the answer. For an inert, non-carbonaceous mineral coating, XF-88 will do the job.

MEXATOP®

(engineering bulletin #5)

gives sounder ingots

MEXATOP is a powder compound which spreads easily over molten ingot heads and casting risers. A ⅛" layer over the molten surface works effectively to prevent cavitation and insure sounder castings.



Write for Engineering Bulletins describing these products.

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THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

ing constructed, has twice the floor area of its Bridgeport, Conn., plant, which will be closed when the move is made.

General Dynamics To Build

Electric Boat Division, General Dynamics Corp., Groton, Conn., will spend $1 million on a research-development center in an expansion program. An additional $500,000 will be spent on shipyard facilities and equipment.

Gear Grinding Enlarges

Gear Grinding Machine Co., added 33 per cent to the floor area of its Machine Tool Division plant in Detroit to accommodate increased production of screw and gear grinding machines.

REPRESENTATIVES

Lamson & Sessions Co., Cleveland, manufacturer of bolts, nuts, cap screws, cotters and special hot and cold-headed products, appointed Oldham-Rust Co. Inc., New York, its sales representative in the metropolitan New York area.

Hydra-Feed Machine Tool Corp., Ferndale, Mich., appointed J. Lee Hackett, Detroit, as a distributor of its line of automatic lathes.

Beryllium Corp., Reading, Pa., appointed C. A. Strelinger Co., Detroit, warehouse distributor for its nonsparking safety tools.

Allis-Chalmers Mfg. Co., General Machinery Div., Milwaukee, named Power Service Inc., Casper, Wyo., distributor for motors and transformers in parts of Wyoming and Nebraska.

Marion Machine Foundry & Supply Co., Marion, Ind., appointed Al Billington and Jim Offtermatt of Billington Metal Sales Inc., Cleveland, as representatives in northern Ohio for the sale of controlled-specification, gray-iron castings.

General Electric Co., Schenectady, N. Y., designated the following distributors to handle its line of arc welders, electrodes and ac-

Specify *Michigan* Tubing for economy and versatility

This gasoline tank filler tube has the overflow pipe brazed to the filler tube at two points and the fastener clamps projection welded to the tube. The cam is spot welded to the tube mouth.

Vacuum cleaner handle with cord holder welded to tubing and elongated hole punched for interior wire and tumbler switch, ready for chrome finish and assembly to the vacuum cleaner.

The muffler inlet pipe above shows how Michigan workmanship performs several intricate fabricating operations to most exacting tolerances.

Fabrication by Michigan of this horn tube, which has a diameter variation of 51 per cent, is another example of the workability of Michigan tubing and of Michigan engineering competence.

ROUND

¼" to 4" O.D. 7 to 22 gauge

SQUARE	Gauge	RECTANGULAR
⅜" to ⅝"	16 thru 22	⅜" minimum side to 5" maximum side
¾" to 1"	11 thru 22	
1" to 2"	11 thru 20	
2" to 3"	11 thru 18	

Carbon 1010 to 1025

For almost 40 years

Michigan has been manufacturing tubular parts for leading manufacturers. This acceptance of Michigan tubing has been won by meticulous attention to customer requirements and the supplying of the very best in tubing. The following advantages of low cost manufacture and utmost dependability are yours when you specify Michigan for tubular parts in the fabrication of your products.

1. It is fabricated in round, square and rectangular shapes, in a wide range of sizes;
2. It is always of uniform strength, weight, ductility and weldability;
3. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted and rolled.
4. It can be formed or machined in your plant or prefabricated at Michigan.

Consult Michigan

for engineering and technical help in the selection of tubing best suited to your needs.

THE OLDEST NAME IN ELECTRIC RESISTANCE WELDED STEEL TUBING

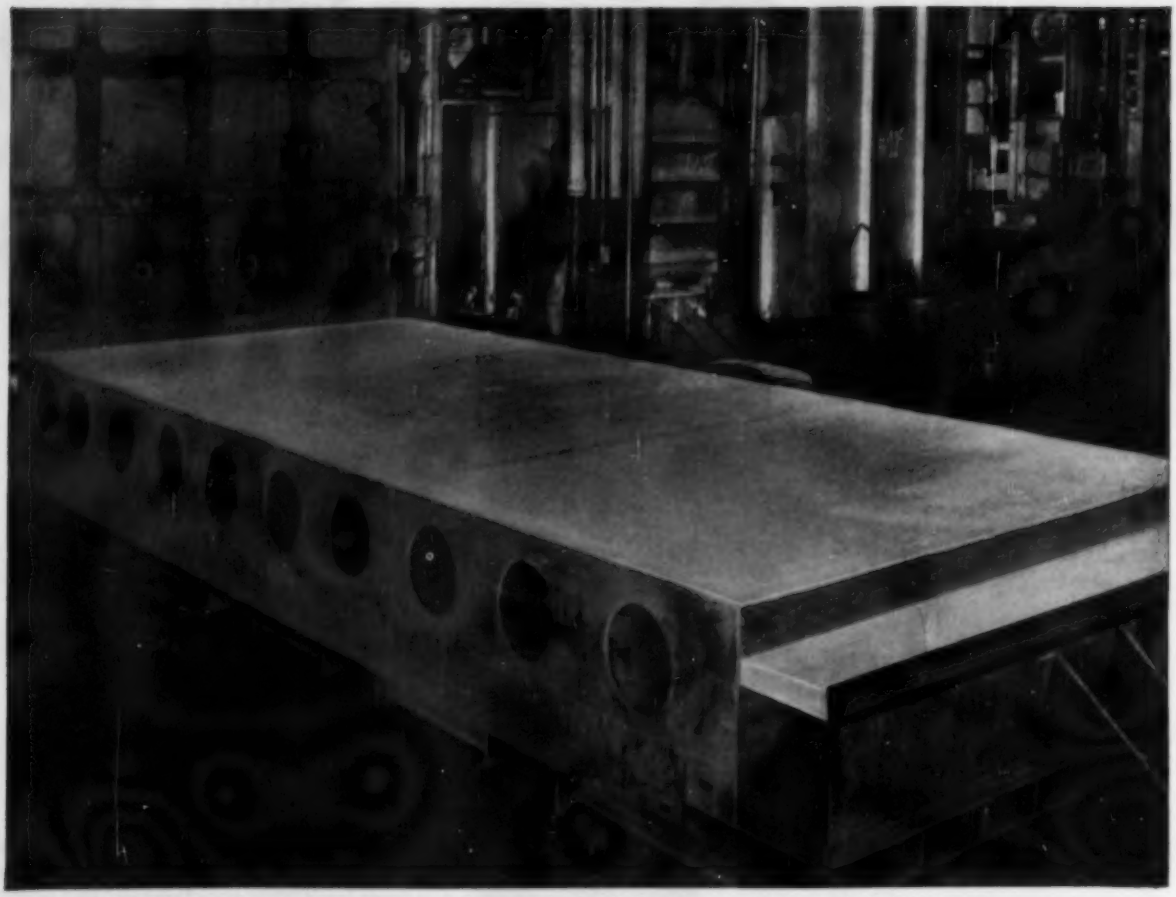
Michigan STEEL TUBE PRODUCTS CO.

Nearly 40 Years in the Business

9450 BUFFALO ST. • DETROIT 12, MICH.

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis —Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland Co., Dayton, Ohio—Service Steel Co., Los Angeles, Calif.—Strong, Carlisle & Hammond Co., Cleveland, Ohio—Globe Supply Co., Denver, Colorado—W. A. McMichaels Co., Upper Darby, Pa.—A. J. Fitzgibbons Co., Buffalo, N. Y.—C. I. Crais Co., Birmingham, Ala.



REFRACTORY CONCRETE CAR TOP in use at Commercial Steel Treating Co., Detroit, Mich. This car top is made with Zero ZR-13, a Lumnite-base castable produced and marketed by Standard Fuel Engineering Co., Detroit, Mich. For over 15 years this company has used refractory concrete for car tops and furnace door linings.

Why does refractory concrete make the best furnace car top?

EASY TO CAST—TROUBLE-FREE SERVICE! Despite repeated thermal shock and temperatures to 1850° F., Refractory Concrete car tops on this particular job gave more than twice the service life of car tops made with previously used materials.

These durable car tops need less maintenance . . . cut over-all costs. Smooth, one-piece sections form an even, level base for castings. And they are easy to make with Lumnite* calcium-aluminate cement and refractory aggregates.

For added convenience, you can use a Lumnite-base castable mix—Lumnite cement plus aggregates selected for specific temperature and insulation needs. All *you* do is add water, mix and place. Castables are made and distributed by leading refractory manufacturers.

You'll find Refractory Concrete made with Lumnite cement excellent for use wherever heat, corrosion or abrasion are problems. Easy to place—by plastering, pouring or cement gun—and it's ready for use within 24 hours! For more information, write Lumnite Division, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

OFFICES: *Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.*

**"LUMNITE" is the registered trade-mark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.*

MM-L-100

ATLAS® **LUMNITE for INDUSTRIAL CONCRETES**

REFRACTORY, INSULATING, OVERNIGHT, CORROSION-RESISTANT

UNITED STATES STEEL HOUR—Televised alternate weeks—See your newspaper for time and station.

cessories: Weld-Arc Sales & Supplies Inc., New York; Interstate Welding Supply Corp., Elizabeth, N. J.; and T. H. Green Co., Rochester, N. Y.

NEW ADDRESSES

Raycon Corp. moved from Redwood City, Calif., to 248 Harbor boulevard, Belmont, Calif. The company makes high-speed mechanical counters and has a division which fabricates and machines metal parts for other manufacturing organizations.

Norton Co., Worcester, Mass., moved its Los Angeles district office to 5905 Pacific Blvd., Huntington Park, Calif.

Irvington Boiler & Steam Engine Works Inc., moved to 222 Pacific St., Newark, N. J.

ANNIVERSARIES

McGill Mfg. Co. Inc., Valparaiso, Ind., is observing the 50th anniversary of its founding. Its Electrical Division now has 60,000 sq ft of manufacturing floor space; its Bearing Division, 150,000 sq ft. The firm is headed by C. S. McGill, president, and R. A. McGill, vice president.

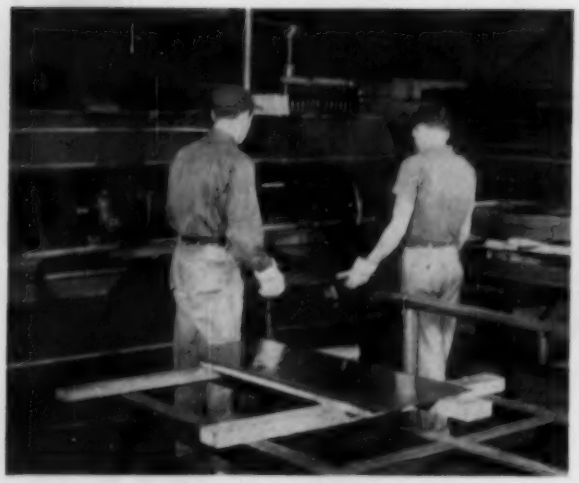
ASSOCIATIONS

Heating & Cooling Coil Manufacturers' Association, Detroit, elected W. C. Jones, Westinghouse Electric Corp., president. New vice president is L. A. Childs, Aerofin Corp., Syracuse, N. Y.

E. Paul Lange became secretary of the **Engineers Joint Council,** New York. He had been assistant secretary since May, 1954.

Steel Founders' Society of America, Cleveland, appointed Robert A. Willey assistant technical and research director. Mr. Willey was chief metallurgist at Commercial Steel Casting Co., Marion, O.

BLAKE & JOHNSON
SINCE 1845
Automatic
Screw Machine
Products
In steel, brass, or other metals . . . from 1/16" to 2¼" diameter are simple production runs at Blake & Johnson. Slotting, cross-drilling, burring, broaching, slabbing, roll-threading and drilling—are every-day operations. Our engineering and manufacturing know-how is at your service whether you need custom-built machine parts or slotted as well as Phillips head machine screws, tapping screws, stove bolts, Twin-Fast® wood screws, special headed products, machine screw nuts, rivets, chaplets, wire forms.
Write for new catalog.
TAPPING SCREW
TWIN-FAST SCREW
STOVE BOLT
MACHINE SCREW
MACHINE SCREW NUTS
SPECIAL WIRE FORM
fastenings
WATERVILLE 40, CONNECTICUT



1 SHEARING—Berger shears operate from 40 to 60 strokes a minute. They will cut sheet steel up to 14′ on the shortest dimensions, and medium-hard stock up to 3/8″. Operators above are shearing sheet steel that will be processed into boiler jackets for the United States Radiator Corp.

2 PUNCHING—Presses used for punching holes, knockouts and stamping small parts are strategically located throughout our plants. Some of them run at a rate of 108 strokes a minute, and their capacity runs up to 250 tons. The press at right above is stamping small parts for boiler jackets.

Republic can fabricate your sheet steel product

...FROM START TO FINISH

Berger Division Provides COMPLETE Contract Manufacturing Facilities

You may not realize how many different products are made in Republic's Berger Division plants because many are fabricated for other manufacturers and marketed under their brand names. We will manufacture *your* product in volume runs—engineer, fabricate, finish, pack and ship, all to *your* specifications.

Some of our contract fabricated products are completely assembled units with operating mechanisms installed. Others are sheet metal assemblies that leave our plants finished with a prime coat, ready for final finishing, assembly and packing by our customer.

Our large stock of standard tools and dies and the specialized equipment of our Berger Plants are available to you. Often we can reduce costly tooling investments because we already have the tools to do the job. Because you use our facilities, you can eliminate the overhead problems of building or expanding your plant.

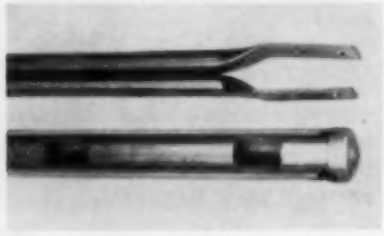
Constant research and development at Berger have resulted in advanced processes and equipment to make your fabricated sheet steel products more attractive, and more economical. Furthermore, our facilities and fabricating experience provide you with the same high quality you see in our own products—lockers, office furniture, shelving and steel kitchens.

If you have a sketch or blueprint, send it along to us with complete specifications. We'll tell you promptly what Berger's specialized service can do for you. Learn more details in Bulletins 793 and 908.

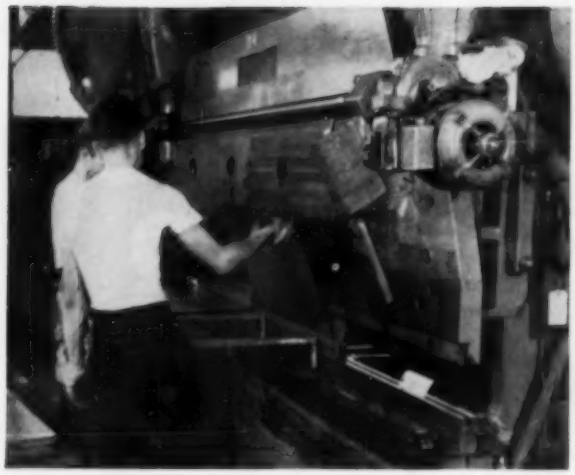
ADDITIONAL REPUBLIC CONTRACT MANUFACTURING SERVICES:

STAMPED AND DRAWN PARTS are produced for some of the nation's biggest manufacturers at Republic's Pressed Steel Division. Facilities include a complete tool and die department, welding and brazing equipment, a full line of stamping presses—plus double-action draw presses. Republic engineers will help you solve your stamping problems. Send coupon for details.

HEADED AND THREADED PARTS can be custom-made at Republic's Bolt and Nut Division—like this track pad nut for a leading tractor manufacturer. It was made at less cost than was formerly possible as a screw machine product. Producers of more than 8,000 special types of fasteners, we employ the very latest in modern tools and techniques. If you have a fastening problem, call us.



TUBULAR PARTS are fabricated from either ELECTRUNITE Carbon or Stainless Steel Tubing by Republic's Steel and Tubes Division. You get precision on a production basis. And you save the cost of new equipment plus valuable floor space. Steel and Tubes will gladly quote prices on any tubular part you need. Send for facts.



3 FORMING—Brakes running at speeds up to a stroke a second range in capacity from 60 to 500 tons making possible production of a variety of items and gages simultaneously. Operators shown here are forming boiler jacket backs. The next stop will be the welding department.

4 WELDING—Berger's major plant facilities include the very latest welding equipment and techniques. For every requirement there's a specific unit properly located to do the best job most economically. Eighty-eight welding units are available in Plant No. 1. The operator above is spot welding stiffener channels to a boiler jacket top.

5 PAINTING—We're proud of these facilities. Our painting equipment will cover over 87,000 square feet of steel surface each hour. Mechanical bonderizers and degreasers clean the mill stock parts before painting. They are then conveyed through one or more of our 32 spray booths or six mechanical dip tanks and finally through one or more of our 40 baking ovens, emerging with a beautiful, lasting, baked-on finish. We'll match your sample for color. Above, the finisher is applying gray enamel to a boiler jacket top.

6 PACKING AND SHIPPING—Boiler jackets are shipped in cartons, knocked down. Carefully packaged these jackets are conveyor transported to inside rail or truck loading facilities. Packing equipment includes newest machines for crate making and automatic nailing. Beyond our doors, more advantages—you are shipping from centrally located Canton, Ohio.

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World's Widest Range

of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
3120 East 45th Street,
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REPUBLIC STEEL

Please send me additional information on:

- ☐ Berger Fabricating Facilities (Bulletins 793 and 908)
- ☐ Pressed Steel Fabricating Facilities
- ☐ Steel and Tubes Fabricating Facilities (Booklet SPD-55)
- ☐ Bolt and Nut Fabricating Facilities

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Company_____

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Room Service

. . . for companies that are growing fast

Friends of ours in the machine tool business recently needed more manufacturing room to keep important customers happy. Expanding sales had absorbed production facilities needed to make their standard line of hob sharpeners. Something had to be done fast.

So they came to Taft-Peirce. We took over the complete production of the hob sharpeners — from base castings to finished product. Machining, heat-treating, assembling, inspection and testing. Then shipped over two hundred of these machines direct to the final customer. Orders were filled, customer good will maintained, and not one cent spent for temporary facilities.

Perhaps you can use a swift, complete, creative manufacturing service like this. Learn more about it simply by sending for our booklet, "Take It To Taft-Peirce".

For Engineering, Tooling, Contract Manufacturing

TAKE IT TO TAFT-PEIRCE

The Taft-Peirce Manufacturing Company, Woonsocket, R.I.

TELEPHONE: WOONSOCKET 1

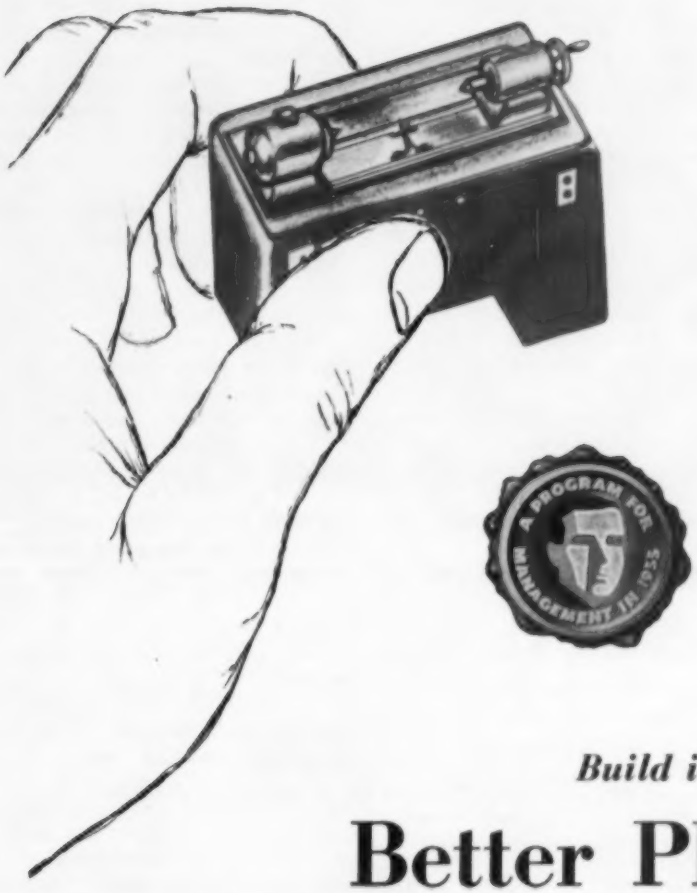
3

STEEL's 1955 Management Series . . .

The editors of STEEL herewith present the third in their ten-part series, Program for Management for 1955. The complete list:

1. **Product Promotion** (Feb. 14, p. 73)
2. **Budgeting for Cost-Cutting** (Mar. 14, p. 93)
3. **Plant Layout** (Apr. 18, p. 93)
4. **Communications** (May 16)
5. **When To Re-equip** (June 20)
6. **Put Business Trends To Work** (July 18)
7. **Consultants** (Aug. 15)
8. **Purchase Analysis** (Sept. 19)
9. **Market Facts** (Oct. 17)
10. **Keep Your Product Growing** (Nov. 14)

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Department, STEEL, 1213 W. Third St., Cleveland 13, O.*



Build in economy through . . .

Better Plant Layout

A NEWLY CONSTRUCTED steel plant building in the Midwest had an overhead traveling crane to carry 50-ton ladles of molten metal to waiting flatcars, which, in turn, rushed the hot metal to another portion of the plant for processing.

On opening day, as dignitaries of the board looked on, the crane carrying its first ladle sped the length of the building toward the first waiting flatcar. Unhappily, the crane missed connections by 10 feet. It was impossible to reach the flatcar. The end of the building had to be torn out and rebuilt.

Start with Management—In a sense, that steel plant was lucky—although 50 tons of cooling metal is no particular asset. It was able to put its finger on a layout error and pinpoint a production bottleneck with a bit less than the usual difficulty. Not only that, management witnessed the deficiency. Many experts agree the biggest single problem in plant layout is making management conscious of the need for change.

"Take a plant right here in town that supplies parts to the auto industry," says a Chicago layout firm. "Five years ago its volume was $7 million a year. Today, it's $35 million, and they're still making the same profit on five times the sales volume. Their efficiency hasn't increased with their sales . . . it has diminished."

War's Effect—"The war did a lot to make management layout conscious," notes a Detroit auto company layout engineer. "During the war, our company shifted from car production to aircraft engines in less than four months, then back to cars again in 1946. When Korea came along, we went into jet engines; and, today, we have a dual-purpose plant that can produce auto parts or jet engines with almost equal efficiency.

"Smaller companies found out about plant layout, too. Remember the shortage of machine tools during the war? Plenty of plants learned how to get the most out of the equipment they had because they couldn't get more to replace it. The changeover to war and return to peace did plenty to make management layout conscious."

Opportunity—It's a cinch man-

agement *should* be layout conscious. Industrial processes become more widely known and more standardized every day. Labor unions are increasingly standardizing wage rates throughout industries. Both factors diminish the margin of potential superiority you have over your competitor. He can cut the same material on the same machines with the same tools. When something new comes along, he hears about it at about the same time you do.

But the edge you can get on your competition lies in the way you use the things available to you both. Your competitor may be just as good on cutting time, but you can get twice as much in and out of your plant in a week through proper work flow and good layout.

Fantastic?—Take a look at what Norton Co. accomplished through establishing good plant layout (page 95).

Brown & Sharpe Mfg. Co. didn't believe an old theory that conveyor assembly is unfeasible for machine tools. Now, automatic and hand screw machines are being produced by the firm on straight-flow lines at about 70 per cent of the former manufacturing cost.

Look at it this way: Every time something is moved in your plant, labor and/or equipment are required to move it. Maybe you employ only 50 people. Three boys with hand trucks transfer stock from one area to the next and remove completed work. Suppose you were able to work out a pattern to save one-third of the moves by installing a $25 chute between two of three operations. That would mean you could cut your handling labor one-third, save perhaps $2500 a year on a $25 investment.

Look at Details—They may seem insignificant. It's human to figure: "We've always done it this way. Why change?" But plant layout details like the above can make for a difference in profit.

Perhaps the most ironic part of the whole picture is that the original installation cost of good plant layout is no more expensive than poor layout. Yet good layout continues to pay dividends every day it is in operation, just as poor layout continues to drain on profits day by day.

Without question, layout is the most fundamental of management functions. It deals with the organization of men, materials and machines for efficient production.

Compromise—"If you feel pretty confident about the layout of your plant," wryly comments a layout engineer, "chances are you don't see it as it really is. That's because the layout of any plant is only a compromise between what management would like to do and what is practical. An executive who is on the ball is seldom satisfied with the way his plant is set up, and is usually trying to figure out some way to make changes."

Not only is any plant layout a compromise, but most plant re-

■ *Just what is plant layout?*

Technically, plant layout is the arrangement of men, materials and machines engaged in making a product. If they were just dumped into the plant, a layout would exist but probably somewhat below average in efficiency.

Getting efficiency into the plant layout is where management comes into the picture. Management, by definition, is the group charged with establishing the relationship of these men, materials and machines for maximum efficiency.

■ *Why is it important?*

You can't pick up a periodical without reading about new ideas on tooling, materials or processes to help you beat the competition. The only trouble is that your competitor is reading them, too. Or, if your competitor doesn't see them, salesmen are telling him.

The margin of difference between you and your competitor is in the way you plan and organize the production elements available to both of you: That's plant layout.

■ *When should a layout change?*

For maximum efficiency, the layout of your plant should be revised to meet a change in production volume, a change in a production process or a change in the plant.

Remember, proper balance is more than a figure of speech. A good index of efficient management is its sensitivity to change and its willingness to move to restore balance. Flexibility can be built into a plant layout, but it must be used.

■ *Who should change the layout?*

Most large firms have full-time layout engineers responsible for these minor shifts which can grow into a heavy list if neglected. The layout engineer must work closely with the foremen, superintendents, time-and-motion-study people, etc., to be sure all factors are considered.

The good plant layout man recognizes that no layout is perfect, but can be only the best suited to existing conditions. His major job is the thorough understanding of conditions, evaluating them and taking appropriate action indicated, upon approval by management.

■ *How is poor layout recognized?*

This is difficult because there is no concise rule. Congestion and confusion, often taken as a sign that "we're plenty busy," mean that the plant is not working at peak efficiency. It's a cinch that no plant can stand still, or it's falling behind.

In evaluating your layout, bear this in mind: The individual operation may be as efficient as your competitors' (possibly lulling you into a false sense of security). Poor plant layout has to do with the flow of materials through your plant. Reduction in handling and distance traveled mean better plant layout.

Norton Co. once trucked from one mill to another and between floors. Now in some cases jobs are being processed with two separate operations being run concurrently. Inline work flow is the answer

quirements are constantly changing. Any time there is a process change, a product change or a change in volume of production, there should be some change in your plant layout.

Perhaps such a change only involves the rerouting of a section of roller conveyor or the transfer of a single employee to a different operation. But the plant which is operating efficiently is sensitive to change by nature. Like an athlete, the well-laid-out, well-managed plant is never off balance, is always ready to adapt.

Undramatic Waste—Anyone can recognize inefficiency in its extremes. Operating a second shift when there is only enough work for one certainly should register with any management man as inefficient. Yet the owner of a medium-sized plant was heard to comment: "Why shouldn't that chap move those parts around the shop by hand truck? He hasn't anything else to do!"

Of course, that man didn't recognize surplus labor. It, like surplus space and surplus equipment, constitutes surplus cost.

Unfortunately, many management men are willing to accept little surpluses as unavoidable, even though a few of them can constitute a big difference in costs.

Conserving Energy—In general, though no two plant layouts probably ever will be alike, good layouts can be recognized by something akin to the conservation of energy.

Everything that happens to the product from the time it enters the plant as material until it emerges as merchandise costs money. The plant recognizing that already is a long way toward the concept of sound plant layout. Just having material in your plant is costly. It occupies space for which you must pay. If you don't need the space, you should be in a smaller building or using it for some directly productive purpose.

By the same token, that layout is best which permits material to move the minimum distance between operations, contains the minimum number of operations to the finished product, uses the minimum

■ *What good layout can do . . .*

When Norton Co. built its new plant at Worcester, Mass., the firm recognized that most of its cost-cutting effort had been going into:

1. Investigating faster and more efficient ways to cut metal.
2. Improved tooling applications.
3. Changes in material.

Surrounding these endeavors were indirect costs or overhead which represented 25 to 50 per cent of Norton's total costs.

As a result, Norton established a straight-line production flow in its new plant. Here are some of the savings:

1. Travel or trucking distances in the plant have been cut from 50 to 90 per cent on parts.
2. Parts that formerly traveled 5200 feet by the old method now travel only 1200 feet.
3. Combining departments decreased tool room and utility labor by 25 per cent.
4. The more systematic flow of material permitted a 20-per-cent reduction in the inspection force.
5. The more efficient layout has permitted a 15-per-cent reduction in the supervisory force.

■ *Why good layout reduces operating costs . . .*

1. By definition, a good layout means that the minimum plant, labor and equipment are going into the product: All space is being used, equipment is being utilized to the fullest and the fewest possible employees are working with maximum efficiency.
2. Production is at the highest degree of efficiency because there are fewer production delays, less congestion and confusion. Workers are working more of the time, keeping labor costs to a minimum.
3. Good work flow means a minimum of materials handling, and as a result, less handling damage and less danger to work in process. Because material is flowing through the plant efficiently, inventory or work process is reduced.
4. Less need for storage area also may be a result of good plant layout, thanks to the reduction of work in process. Establishing a work flow reduces the need for work scheduling from one department to the next.
5. Not to be minimized are the effects of a well-laid-out plant on worker morale. Elimination of confusion and proper layout of the work area help get the best out of the worker. In addition, conditions in such a plant minimize the risk of accident, which in some states merits workmen's compensation payment reductions.

amount of plant space, takes the minimum amount of time in process, requires the minimum number of workers performing the maximum amount of work, etc.

Anything that detains that material inside your plant or requires work costs you money.

Kinds of Layout

With that concept, the most efficient layout would be a production line setup with material entering the plant at the start of the production line, moving from one immediately adjacent operation to the next without pause and ultimately moving off the line onto a waiting truck at the other end. Unfortunately, like the cube root of zero, this normally is an imaginary quantity which can only be approached in layout work.

Conditions—The degree to which the layout of a given plant approaches this ideal is contingent upon conditions of production. To make line production feasible even in modified form, it is necessary to have a large quantity of similar pieces to make. Operations must require about the same amount of time. Demand for the product must be relatively steady. Production must be continuous, balanced and repetitive.

Line production is successful to the degree that these conditions exist. It must be borne in mind that interruptions at any given point on the line can disturb the production from the point of interruption onward. So the banking of parts is often employed—an example is offered at the recently completed Chevrolet engine plant at Flint, Mich. (page 97). Use of parallel production lines is another technique. It not only permits continuing production during a breakdown at a given point but also permits partial operation by running a portion of the equipment rather than all of it for shorter periods of time.

The concept of the plant becoming one long machine is held with reservations even by the nation's largest auto producer.

Layout by Process—More practical for most plants is the second basic type of layout—by process, work performed or departments. Layout by process is the familiar production arrangement by which work is transferred from one department to the next by pallets or tote boxes and is processed through the equipment in turn.

It is the modus operandi for jobbing shops because it is ideally suited to the handling of a wide variety of products both in quantity and configuration. The need to balance operation time is relatively less important. For that reason, investment in multiple equipment often required for line production is not necessary.

Layout by process, however, also is found in such mass production fields as the auto industry. Two factors are usually involved: Either the equipment is heavy and requires special services, which precludes installation on the line, or the operation requires more time than can be properly worked into the line flow.

Exception — An automaker example is the heat treating of automatic transmission gears by Chrysler Corp. Putting a furnace into the production line of sufficient length to allow time for the gears to come up to temperature would be prohibitive from space and cost standpoints. For that reason, gears are delivered by conveyor from the machining area and gathered into baskets for processing through the furnace much like job lots. They re-enter the production flow by conveyor, resuming the assembly schedule.

Other advantages of the layout by the process plan include less stringent maintenance requirements, less duplication of equipment and the fact that work loads may be apportioned by scheduling to keep equipment uniformly busy. In many instances, the need for inspectors will be reduced and small quantities of a part may still be produced at a profit.

Cost Vs. Savings — It's certain that any production line is a poor investment if the cost of setting it up exceeds the savings gained by having it. But many plants which have considered themselves jobbing shops could benefit by having temporary production lines.

Such aids as a sectional con-

veyor, which may be used quickly and inexpensively to connect any series of machines, can often bring line production savings. And plants producing only one product usually should come close to having production line flow, provided quantity is sufficiently high.

But there can be pitfalls in conveyors. Let's say it now takes one man with a hand truck to handle the movement of the part from one area to the other. If a conveyor is installed, it could take two men instead of the one—one to load and another to unload. On the other hand, some features are justified largely because they make the job easier for the worker. In a larger plant, handling can serve such additional functions as work positioning, storage and schedule maintenance.

Today, handling is one of the most important items in any plant layout because of labor costs. But there are many other factors to consider. Whether you're building a new plant or looking at your present facilities with a jaundiced eye, the best approach is to start

■ *What is good layout?*

In general, it is that arrangement of men, materials and machines which gives the lowest unit production cost. To that end, the minimum amount of expenditure to accomplish the result is to be desired.

Here are some clews for recognizing the direction in which such efficiency lies, though not all objectives are possible in any one layout:

MEN

1. The layout should utilize the minimum number of men to do the job.
2. Each man should perform the minimum number of motions to perform the operation.
3. The motions should require the minimum amount of time and energy.

MATERIAL

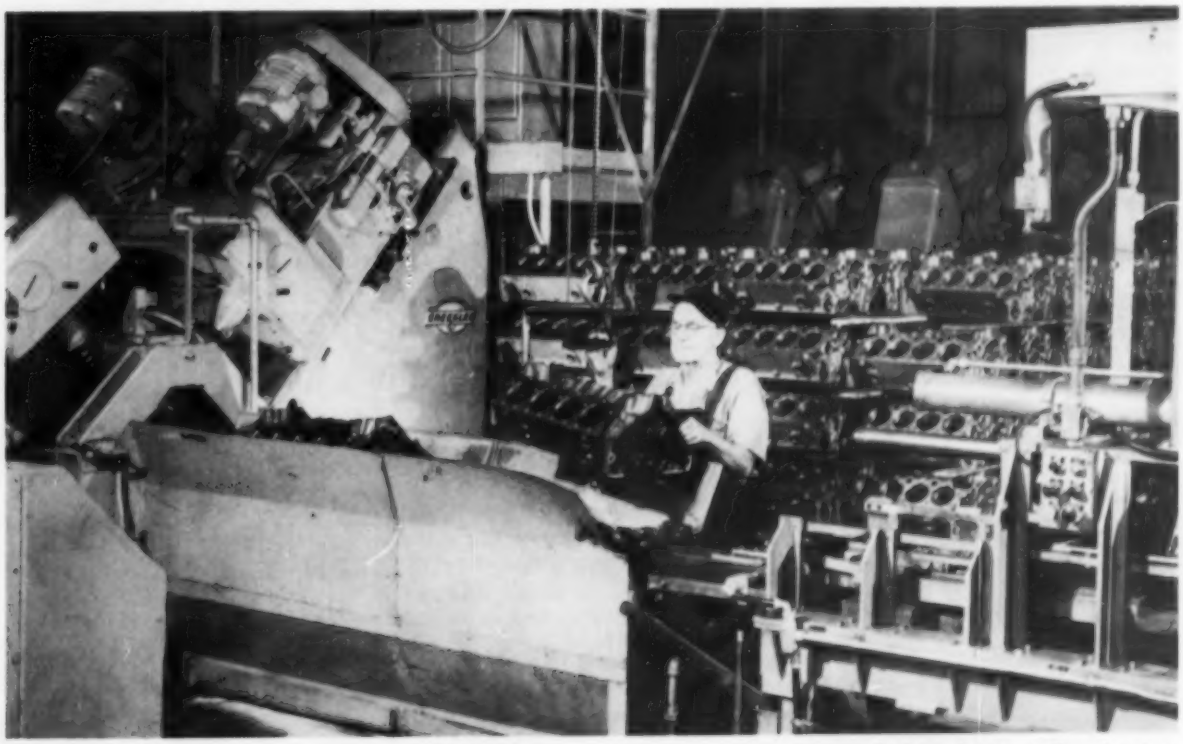
1. Material should move the minimum distance between operations.
2. Material should move a minimum number of times.
3. Material should move as continuously as possible while it is in the plant.

MACHINES

1. Machines should be idle a minimum time.
2. Machines should be arranged in the sequence in which the operations are performed.
3. Machines should be suited to the purpose for which they are to be used.

PLANT

1. Area should be the smallest possible to do the job.
2. Conditions should be those best suited to worker efficiency.
3. The greatest possible flexibility commensurate with production objectives should be retained.



Banking of parts at Chevrolet gives job-lot flexibility to inline output

from scratch. It's easy to lose the forest for the trees. Besides, you want to look at the ideal to determine how far off the mark you are.

Starting from Scratch

Begin with the plant as a whole. Consider it as a group of processes rather than machines, and establish the simple flow lines. Then fill in the basic operations, fitting them to the flow pattern. At this point do not consider the practicality of the relationship from any standpoint—just the flow of work from raw material to finished product.

Questions — Now examine the purpose of each operation shown on the routing. Is each step necessary? Could combining or separating steps cut down the number of operations or the distance the parts would have to travel? Would it be possible to set up the sequence in such a way that one worker could perform two steps? Could two operations on a portion of the part be combined by combination tooling?

Is the method of doing the operation the best possible? Might another technique of fabrication fit into the operation better from a time or productivity standpoint? Could any given part if purchased from a supplier eliminate costly facilities not fully utilized? Could any series of machining operations be combined by automatic handling?

Time Is Now — This, in other words, is the time to establish whether you are doing the minimum operations in the proper manner and in the right sequence. It must be presumed that the product itself is already fully developed from a production standpoint—that would have a major bearing on the processes required.

Next, establish the balance of equipment. Set up specific machines and their rated capacities, predicated upon your estimated volume for the foreseeable future. With layout by process, equipment and its location may be largely determined independently in terms of over-all plant capacity. With line production, or a combination of it and layout by process, getting balance may be more difficult.

Break Chokepoints — In most cases the balance will be disturbed by one or two bottleneck operations. The purchase of duplicate equipment may give too much capacity, while a single machine falls short of the hoped-for goal. Possible solutions include the consideration of other equipment or methods, including the breaking down of the operation performed at this station. Surplus pieces may be allowed to accumulate for finishing on a job-lot basis later, or the machine may be operated on a second shift.

Another useful technique is the banking of material in the line between segments with differing speeds. Such banks also should be provided for immediately following critical inspections or operations where rejections or breakdowns occur frequently. Banks also should be used ahead of production or assembly lines where a sequence of operations depends on a steady flow of material.

Visualizing Layout

It now is time to begin a layout to visualize more readily the relationship of these factors. With processes and equipment basically established, the services and handling facilities, manpower and other production requirements must be set up and met. Through visualization, economies often may be effected through joint utilization of utilities, multiple use of a single conveyor, etc. At this point those factors which enter strongly into the compromise with the ideal begin to reshape the layout. Compromising factors usually stem from possibilities for savings in plant cost.

Two Aids—Additionally, provision for maintenance of equipment must be made. Inspection stations must be set up and the myriad of employee facilities must be established. To do this job effectively, two types of visual layout are used:

The two dimensional, which in effect is a blueprint with movable parts, or the three dimensional, which utilizes models of the equipment. In both cases, the most common scale is ¼-in. to the foot. Both two-dimensional templates

Basic Types of Layouts in Metalworking

■ ***Layout by process . . . used when***

1. A wide range or variety of products must be made with the same equipment.
2. Different operations in the production sequence require greatly differing lengths of time.
3. Production is run in job lots, or demand for the product fluctuates.
4. Sequence of operations is different for various products produced in the plant.
5. Machinery is large and cannot be located in the production line for physical reasons.
6. Interruptions of the production flow are anticipated.

■ ***Layout by production line . . . used when***

1. A large volume of products is to be manufactured.
2. Products to be manufactured are similar in certain portions or entirely.
3. Operations may be balanced and continuity of production flow obtained.
4. Sequence of operations is the same or repetitive.
5. Savings through setting up the production line exceed setup costs.
6. Equipment will be utilized a major portion of the time.

and three-dimensional models are commercially available to represent nearly all types and brands of shop equipment (this page).

One important consideration, should you decide to make your own templates, is the inclusion of the full traverse area of the machine, swing of any arm, etc. It also is frequently useful to show the base as a dotted line within the outline of the machine to give a better picture of work conditions when using the templates, a consideration not required with the models.

Advantages—Many layout men prefer to work with the three-dimensional models because full utilization of plant area includes not only floor space but also the cubic capacity of the building. Three-dimensional models permit better visualization of this problem, they maintain. The slight additional cost is compensated for handsomely by the better layouts.

Another factor: Management often is more easily sold by this form of layout, which is readily grasped.

A final fundamental consideration in favor of the three-dimensional layout is the current emphasis on materials handling. Handling costs, if inefficient, can reach 40 per cent or more of the total cost of an item. Universal conveyor systems installed overhead often are useful even in a process layout and can be better visualized in 3-D. The relationship of balconies, implications of ceiling support posts, etc., also can be fully grasped even by the relatively uninitiated.

Finalizing the layout is a proposition more easily stated than accomplished. In each case of possible alternatives, considerations of cost comparison, limitations on future growth, flexibility and other dollar-and-sense factors must be carefully weighed against the theoretically most efficient ideal layout. Starting with the ideal, modifications from it should be made only with the justification of greater efficiency. In theory, the result should be the most effective compromise.

Compromise—A danger is present here. Sticking too closely to the ideal will limit possible advantages to be gained through de-

This engineer uses templates and models in . . .

Ford Motor Co.

■ *Making or revising* a layout . . .*

1. Consider the plant as a whole—what is being done and why. Establish the relationship of the production areas to each other and set up the simple flow pattern. Start with the theoretical to gain perspective and to establish a goal, however unattainable.
2. Plan the processes around product design and manufacturing specifications. With the anticipated volume, establish the balance of equipment needed.
3. With the processes and machinery established, services and handling facilities, manpower and other production demands may be set up and met.
4. Having worked out the production concept with the interior of the plant much like a single machine or tool, the layout engineer finally is ready to put the skin on his plant or set up building requirements.

*To revise a layout, first start with the ideal and compare the present layout with it for a measure of the job to be done and a realistic appraisal of present obstacles.

■ *Pitfalls to avoid . . .*

1. If a new building is being built, plan for possible expansion, product or process changes that may come.
2. Be sure to provide for maintenance of machinery. The most common complaint with layouts is inadequate access for maintenance men.
3. Consider carefully the utilities required by the various pieces of equipment and possible economies of equipment grouping around common utility sources in the plant.
4. Seek the help of others who will be involved in the layout and can contribute ideas on methods. Process engineers, maintenance men, department foremen, etc., all should be consulted.
5. Above all, remember that plant layout is a top management function, requiring special skills and aptitudes. The layout man must know your operations as thoroughly as you do to properly anticipate problems which may arise. You must know what he is trying to accomplish to aid him properly. But don't delegate plant layout to a foreman who isn't busy.

Is layout really important? Chrysler Corp. had a bad layout situation which forced it to truck auto bodies across busy Jefferson avenue in Detroit 300 times daily. Its solution: Build a conveyor across the street (here it's shown partially completed). The remedy is unusual and expensive, but it shows how important layout is.

partures for the sake of efficiency and lower cost. Overdoing it in either direction is poor plant layout in the sense that the most is not being achieved for the least amount of money.

Arriving at the best possible compromise is somewhat a combination of science and art. The best instruction is gained only through experience, which often can be costly. Principles of plant layout can be taught. Judgment, which is a necessary tool in their application, must be gained through trial and error.

Layout Specialist

That has given rise over the last two decades to a steadily increasing and improving group of layout engineers. Their work formerly was confined to the larger plants, but, today, they frequently find themselves working on plants that employ 100 persons or less. Most plant management agrees that the layout man working full time in the larger plant carries his weight nicely, but the layout consultant working on smaller company problems often brings the experience of other companies, even other industries, with him.

Pitfall—Beware of the so-called layout expert who comes into your plant and immediately begins making suggestions for a sweeping revision. It's possible that he's so familiar with your type of operation, your products and your plant limitations that he can do it, of course; but, more likely, he's quoting textbook ideas on how things ought to be done and ignoring practical considerations.

The really expert layout man begins by attempting to understand thoroughly your operations, what you make and why you make it that way. He knows that it's his job to know as much about the procedures sequence in your plant as you do. In no other way can he bring to bear all the factors that must be considered in arriving at the most efficient layout compromise.

What He'll Do—If you're doing a relayout of your present facilities, he'll carefully go over the plant, not only getting dimensions and locations of heating, electrical, air and water lines but also employee and maintenance facilities. He'll make sure that he knows that plant as well as your top maintenance man.

If you're building a new plant, he'll help you consider the question of whether a special-purpose building is justified. Granting that such a structure may be more efficient in many cases, it also can be a white elephant when it comes to resale. The probable saving through the special-purpose features of the building will be brought to your attention in his recommendations.

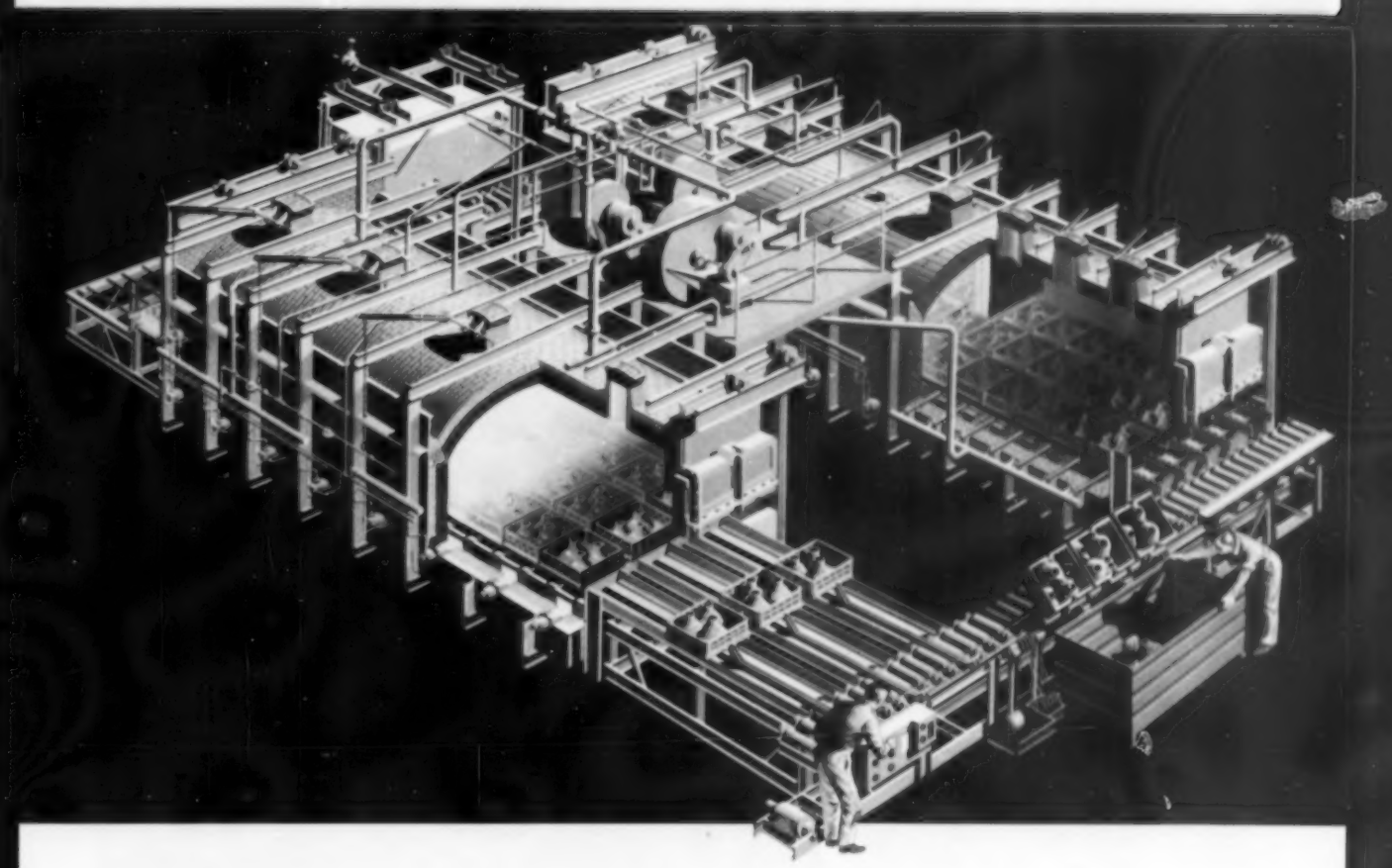
Up-to-Date—You also may be sure he'll be up to date on such items as plug-in electrical ducts, various types of power conveyors, lift trucks, inline heat treating equipment, etc. Layout firms are continually bombarded with the latest in brochures by hopeful manufacturers of potentially useful plant trappings.

But that's only part of the story. The really big layout firms, like Giffels & Vallet Inc., L. Rossetti in Detroit, combine such talents as process engineers, mechanical engineers, electrical engineers, structural engineers and architects under one roof. They can take a sample of what you'd like to manufacture and carry it clear through to pushing the switch that does it in your brand new plant.

Conclusion

Chances are, your plant layout needs are not so extreme. But the chances are, too, that needs are there. It might pay to take a look at your plant right now and ask yourself if things may not be too busy. For just as an executive who is too busy may need organization, so may his plant.

Remember, there's more than enough to know about plant layout today to support the field of layout experts. The job of management is to understand what the layout engineer can do, how he sets out to do it and recognize the need for his services. That's the function of articles like this—to make you ask yourself: Can my layout be improved?



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Here is a typical cycle. Forged alloy steel automotive parts, such as clutch plates and drive pinions, are loaded into three trays and positioned in front of the furnace pusher on the left. The furnace takes over.

The trays move automatically into the heat and soak chamber where the parts are heated to 1700°F. and held at that temperature for a timed interval. Then they move to the next section and are control-cooled to 1200°F. at which moment they move to the final zone and are control-cooled to 500°F. At this time the trays are ejected to a transfer table from which they are automatically emptied into tote boxes.

An ingenious arrangement of recording controllers, fuel regulators, thermocouples, and air control valves automatically hold the temperature to within extremely close limits. Yet this precise furnace anneals as much as 4000 pounds of forgings per hour.

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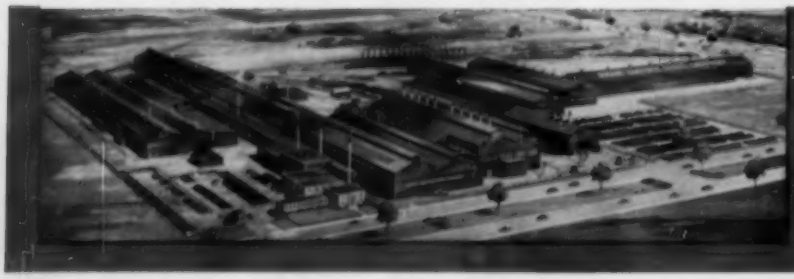

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STEEL
April 18, 1955

Technical Outlook

FORGING GUARANTEES—Civilian benefit from the Air Force Heavy Press Program: Better guarantees on aluminum hand forgings. The know-how acquired in developing big ingots for heavy presses is back of Kaiser Aluminum & Chemical Corp.'s offer: Ultrasonically checked forgings guaranteed with inclusions no larger than AUSR No. 3 standard, and with much improved physicals.

EASY MEASUREMENTS— Blaw-Knox Co., Pittsburgh, solved the problem of measuring wall thicknesses in inaccessible pipe sections. With an ultrasonic reflectoscope, engineers take thickness readings to within 0.005 in.—and do it in a hurry.

INTERNAL STRESS—Three-dimensional stress analysis is making it possible to determine stresses deep in the interior of a body. The method was developed in the photo-elasticity laboratory at Illinois Institute of Technology, Chicago.

HI-TEMP MAGNESIUM—Thorium alloys of magnesium, recognized for their excellent tensile strength and creep resistant properties in the 300 to 700° F range, used to be available only in the cast form. Now Brooks and Perkins Inc., Detroit, is rolling sheet and plate in alloy HK31. This should fill a gap in jet engine and missile applications.

WANTED: INNOVATIONS—Got an idea for a flying submarine? Or a material that can stand temperatures that no others can? The Air Research and Development Command will listen to any and all. Despite ARDC's own extensive research programs, it feels that it can't pass up any ideas that will help maintain our superiority in the air. Send yours to Assistant for Innovations, Air Research and Development Command, Box 1395, Baltimore 3, Md.

SAFETY IN THE DARK—Don't forget safety when the lights go out. Reflective signs or markers on pillars, fire escapes, doors, fire alarms, extinguishers and emergency shutoff valves identify them in the dimmest light.

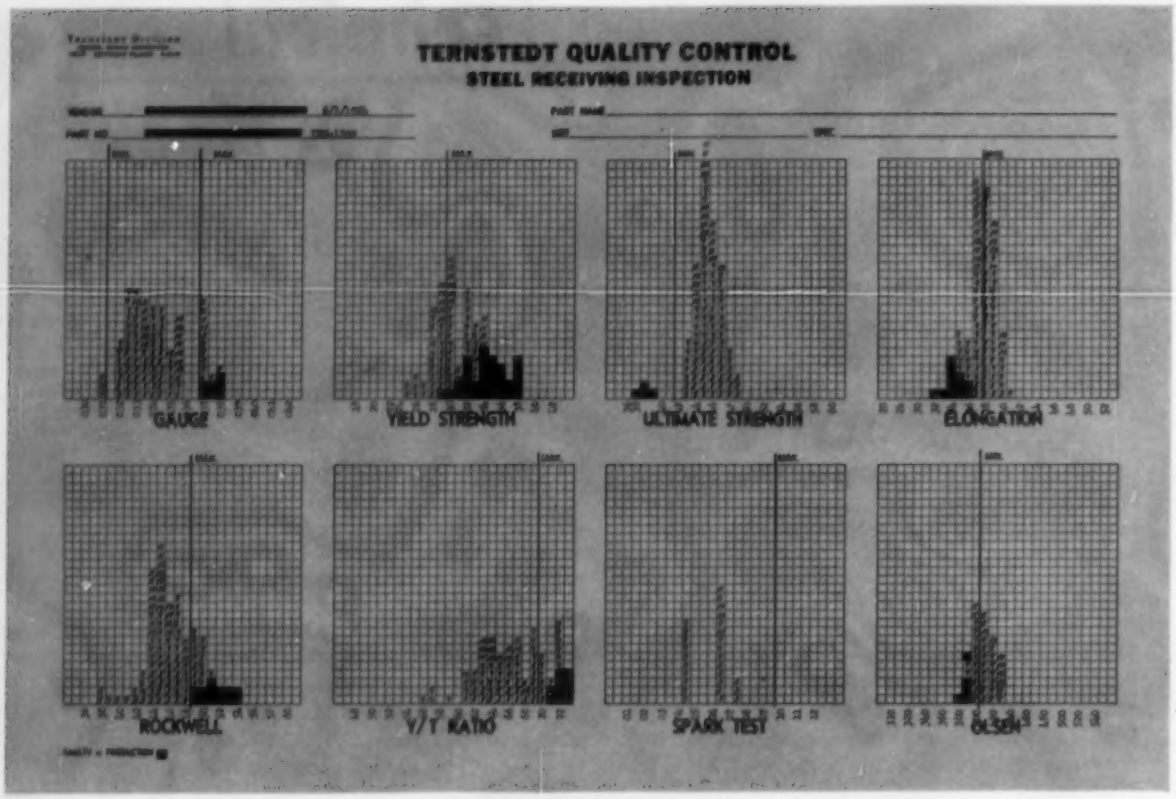
CLEAN WATER—Monsanto Chemical Co. says it has developed a chemical flocculant to remove suspended solids from foundry wash waters. The material, Lytron 886, is effective in concentrations as low as two parts per million.

NYLON BRANCHES OUT—Add caprolactam-type nylon to the several others enjoying growing industrial use. Besides already demonstrated uses—gears, bearings, cams, tubing, fasteners, insulation, rollers, latch parts and slides—it is being tried in new fields. Because it can be crystal oriented for higher-strength thin sections and films, and has the typical nylon qualities of heat and solvent resistance, it is being suggested for conveyor belts.

HOT STRENGTH—Typical of new refractories with higher tensiles is a silicon carbide slab 8 x 10 in. and only 1½-in. thick. At 3000° F it will support the same load as slabs several times thicker without warping or cracking.

TITANIUM TARGET—Aircraft is ready to put the wonder metal to work on a paying basis. Last year, Convair used 124,000 lb of steel screw fasteners in 3/16 and ¼-in. sizes. The same fasteners in titanium would have weighed about 70,000 lb—would have saved weight equivalent to another aircraft. Convair is now using 400 lb of titanium on its supersonic F-102, and expects to double the amount shortly.

Metalworking Outlook—p. 47 Market Outlook—p. 145



This is a typical histogram showing how one vendor's shipments of a particular steel fared under lab test. Blocked-out areas indicate failures on the job. Failures help verify placing of maximum and minimum limits

Steel Buying by Statistics

Plotting of test results on all incoming steel keeps job failures to a minimum at Ternstedt. System also proves to suppliers the need for certain physical qualities

By THOMAS F. HRUBY
Associate Editor

If steel fails to pass preliminary tests, it isn't even removed from the trucks. Little steel is rejected at this point, however

THEY'VE DISCARDED the convenient expression, "suitable for the job," which appeared on most steel orders for Ternstedt division, General Motors Corp., Detroit. Result: More steel than ever before is meeting specific job requirements. So costs are down.

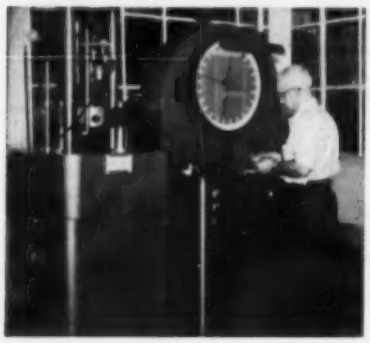
No magical formula is involved. In its common-sense negotiations with steel mills, Ternstedt presents statistical quality control figures that prove what it contended all along: Each job requires some key physical properties that shouldn't be too difficult to maintain at the mills.

Background — Early in 1952, Ternstedt set up a steel receiving

inspection crib. Previously, most production improvement efforts were in the direction of tool and die design, with steel selection left to a trial-and-error system. Big aim of the new department was to buy on the basis of job data.

The system plays a dual role. Immediately, it plugs loopholes through which defective steel might get into production. Over the long pull, it provides accurate data to pinpoint steel selection.

How is it working? In a recent 12-month period, 1841 tons of steel were rejected out of a total of 31,000 shipped, but only about 750 tons were returned to the vendors. The rest was satisfactory for jobs other than those originally intended. More significantly, Ternstedt has found that mills will meet certain requirements on physicals when statistical data prove their validity.



Steel destined for critical parts gets the full lab treatment. A full test report is made and filed on every group of samples and the data plotted on the vendor's histogram of that particular material

Nucleus—The real center around which quality control revolves is the receiving inspection lab. "Sure we had a lab before," commented Douglas Beaudry, superintendent-quality standards, "but by the time defective steel was discovered, coils had been slit and perhaps half of the job run off. Now we check incoming steel as closely as any other purchased part."

Checks start before the steel is unloaded. Inspectors verify purchase dimensions, freedom from physical damage, rust and other external conditions. Steel that passes this test gets a red paint stripe which means it has not been thoroughly inspected or released for production use.

Crib Inspection—Now the steel receiving inspection department takes over. The inspector determines correct sample size and number of samples according to accepted practice. Specimens are sheared from stipulated coils in the shipment.

If the steel is destined for parts on a critical list, samples are delivered to the steel inspection laboratory. Otherwise, the inspector would take samples to the crib in his area and subject them to Rockwell tests, bend tests, surface and dimensional checks. If all tests are satisfactory, a green stripe is added, and the material is released for production.

Full Lab Inspection—Steel des-

TERNSTEDT DIVISION
GENERAL MOTORS CORPORATION

QUALITY STANDARDS STEEL TEST REPORT

PART NUMBER 4154174-5

VENDOR United States Steel (Gary Mill) DATE 3/22/54 MATERIAL DIM .033 x 41¼"
NUMBER OF COILS 1 WEIGHT 9030# PURCHASE ORDER NO. TD-48504 LOT LOAD NO. A-49379
HEAT NO. 506129 MILL NO. J-690-1 DATE RECEIVED 3/19/54 REFERENCE NUMBER H.T. # 4144

MATERIAL SPECIFICATION	INSPECTORS FINDINGS
MATERIAL C.R.S. E.D.D.	MATERIAL C.R.S Coil (Draw. Qual. Rimmed)
GAUGE .030/.037 WIDTH 36½"	GAUGE .0314/.0323 WIDTH 41¼"
LENGTH 37½" TEMPER #3	LENGTH TEMPER #3
FINISH Suitable for one coat synthetic enamel ... 1008	FINISH OK OK
HARDNESS OR TEMPER Rockwell B-40 to 48	HARDNESS B-41 to 43
DRAWABILITY NOTE	DRAWABILITY NOTE
COMMERCIAL QUALITY	COMMERCIAL QUALITY
DEEP DRAW	DEEP DRAW
EXTRA DEEP DRAW ✓	EXTRA DEEP DRAW
KILLED STEEL	KILLED STEEL
	GRAIN SIZE TEST
	BEND TEST OK PARALLEL TO ROLLING OK TRANSVERSE TO ROLLING OK
	GRAIN SIZE TEST .401 - .410 GRAIN SIZE #7
	RING TEST PLATE THICKNESS

TENSILE TESTS

SAMPLE NO.	WIDTH INCHES	THICKNESS INCHES	AREA SQUARE INCHES	YIELD STRENGTH LBS.	YIELD STRENGTH P.S.I.	ULTIMATE STRENGTH LBS.	ULTIMATE STRENGTH P.S.I.	ELONGATION INCHES	ELONGATION %	ROCKWELL B	YIELD / TENSILE RATIO %
1 *	.497	.0314	.0156	396	25,400	713	45,700	.83	41.5	41	55.5
2 *	.498	.032	.01595	418	26,200	758	47,550	.82	41	42	55
3 Δ	.498	.0323	.0161	428	26,600	761	47,250	.81	40.5	43	56.5
4 Δ	.497	.032	.0159	433	27,250	757	47,600	.84	42	43	57.5

* PARALLEL TO DIRECTION OF ROLLING Δ ACROSS DIRECTION OF ROLLING

COMMENTS Very Slight Directionality Effect

INSPECTOR J Charney

DESIRED PHYSICAL PROPERTIES

TPM No	TYPE	CLASS	ULTIMATE STRENGTH (P.S.I.)	YIELD STRENGTH (P.S.I.)	YIELD TENSILE RATIO	PERCENT ELONGATION IN 2 INCHES	ROCKWELL	OLSEN READING	CARBON CONTENT (SPARK)	GRAIN SIZE	CLEANLINESS	REMARKS
1707	C.R.S.	COMMERCIAL QUALITY SHEET	45,000 MIN.	38,000 MAX.	.85 MAX.	29.0 MIN.	B-60 MAX.	.380 * MIN.	.10 MAX.	5 to 8	G. M. NON-METALLIC INCLUSION CHARTS No 5 PAGE Y-54	SUITABLE FOR EXPOSED PAINTED PARTS SUBJECTED TO A MODERATE DRAW DURING FABRICATION
1709	C.R.S.	DRAWING QUALITY SHEET	42,000 MIN.	30,000 MAX.	.70 MAX.	37.5 MIN.	B-48 MAX.	.400 * MIN.	.10 MAX.	5 to 7	G. M. NON-METALLIC INCLUSION CHARTS No 3 PAGE Y-53	SUITABLE FOR IDENTIFIED PARTS TOO DIFFICULT FOR THE DRAWING PROPERTIES OF SHEET STEEL OF ANY OTHER QUALITY. THIS STEEL SHOULD BE USED PROMPTLY TO AVOID AGING
1711	C.R.S.	DRAWING QUALITY KILLED SHEET	41,000 MIN.	28,000 MAX.	.70 MAX.	38.0 MIN.	B-47 MAX.	.400 * MIN.	.10 MAX.	5 to 7	G. M. NON-METALLIC INCLUSION CHARTS No 3 PAGE Y-53	SUITABLE FOR IDENTIFIED SEVERELY DRAWN PARTS. STEEL DOES NOT AGE MATERIALLY AND IS FREE FROM SURFACE DISTURBANCES SUCH AS STRETCHER STRAINS
1717	C.R.S.	REGULAR QUALITY STRIP No 4 TEMPER No 1 DULL FINISH	45,000 MIN.	38,000 MAX.	.80 MAX.	29.0 MIN.	B-60 MAX.	.380 * MIN.	.10 MAX.	5 to 8	G. M. NON-METALLIC INCLUSION CHARTS No 6 PAGE Y-54	SUITABLE FOR EXPOSED PAINTED PARTS SUBJECTED TO A FAIRLY DEEP DRAW DURING FABRICATION
1719	C.R.S.	DRAWING QUALITY STRIP No 4 TEMPER No 1 DULL FINISH	45,000 MIN.	36,000 MAX.	.70 MAX.	33.0 MIN.	B-55 MAX.	.390 * MIN.	.10 MAX.	5 to 7	G. M. NON-METALLIC INCLUSION CHARTS No 3 PAGE Y-53	SUITABLE FOR EXPOSED PAINTED PARTS SUBJECT TO A DEEP DRAW DURING FABRICATION. THIS STEEL SHOULD BE USED PROMPTLY TO AVOID AGING.
1721	C.R.S.	DRAWING QUALITY KILLED STRIP No 4 TEMPER No 1 DULL FINISH	44,000 MIN.	35,000 MAX.	.70 MAX.	35.0 MIN.	B-53 MAX.	.400 * MIN.	.10 MAX.	5 to 7	G. M. NON-METALLIC INCLUSION CHARTS No 3 PAGE Y-53	SUITABLE FOR PAINTED SEVERELY DRAWN PARTS MATERIAL DOES NOT AGE MATERIALLY AND IS FREE FROM SURFACE DISTURBANCES
1728	STRAIGHT CHROME STAINLESS STEEL	DRAWING QUALITY GM-DITOS TYPE 430 No 1 LUSTRE FIN.	70,000 MIN.	55,000 MAX.	.72 MAX.	22.5 MIN.	S-30T 68-72 PREFERRED	.350 * MIN.	.08 to .12	CHROMIUM % 16-18	NICKEL % 0.0	SUITABLE FOR ALL STAINLESS STEEL PARTS EXCEPT WHERE THE SEVERITY OF THE DRAW CALLS FOR TPM 1738.
1738	CHROMIUM NICKEL STAINLESS STEEL	DEEP DRAWING QUALITY TYPE 301 No 1 FINISH	110,000 MAX. 90,000 MIN.	50,000 MAX. 45,000 DESIRED	.50 DESIRED	50.0 MIN.	S-30T 68-72	.400 to .500 *	.08 to .12	17.0 18.0 17.5 DESIRED	7.0 8.0 7.5 DESIRED	SUITABLE FOR IDENTIFIED DRAW PARTS TOO DIFFICULT FOR THE DRAWING PROPERTIES OF ANY OTHER QUALITY OF STAINLESS SUPPLIED TO TERNSTEDT

* OLSEN CUP TEST READINGS ARE EXPECTED ONLY ON SHEETS OF .030" TO .040 ACTUAL THICKNESS

These are the Ternstedt Process Materials specifications (TPM's) developed for production steels

tined for critical parts gets the full treatment when samples are delivered to the lab. Expensive equipment is used to get accurate gage, yield strength, ultimate strength, elongation, Rockwell, yield/tensile, spark tests and Olsen test readings.

At this point, a statistical quality control approach is employed to better display, summarize and analyze the data. Information is plotted on histograms (leadoff illustration, top of page 104) which show graphically how every shipment of a particular vendor fared in the eight tests. There is a sheet for every product he delivers, and Ternstedt has added a definite time element to the charts by using the month number when they're plotting a new shipment.

Failures—Occasionally, steel released by the lab as "O.K." for production does not fabricate properly. Perhaps there's a high percentage of cracks. This information is relayed to the laboratory. Previously plotted characteristics are blocked in on the histograms.

Study of histograms establishes maximum and minimum operational limits for each physical characteristic. Blocked-in areas (failures) act as excellent guides in establishing new limits or confirming older ones.

The steel and the dies actually establish their own operational limits by either fabricating satisfactorily or failing, but it should be remembered that these limits apply only to this particular set of dies.

Tryout Program — When a new job comes along, and while the dies are being made, the engineer on the job requests tryout steel of the type he considers necessary to make the part. If everybody concerned agrees with his choice, Steel Inspection submits material to the tool vendor. Its properties are slightly on the low side of what generally can be expected.

When the dies are successfully developed in this stock, steel troubles are greatly minimized as the part goes into production. If Steel Inspection disagrees with the engineer's choice, it may recommend another grade with the thought of developing tools with the most economical steel that will do the job satisfactorily. But whatever steel is chosen, samples on the low side in physicals are always sent to the tool vendor.

Purchasing Aid — Operational limits are also used on purchase specifications where none existed before or in revising out-of-date limits. Ternstedt Process Material specifications (TPM's) for every type of steel contain a standard AISI specification and the minimum and maximum limits of physical properties which have been developed through histogram experience and negotiations with the mills.

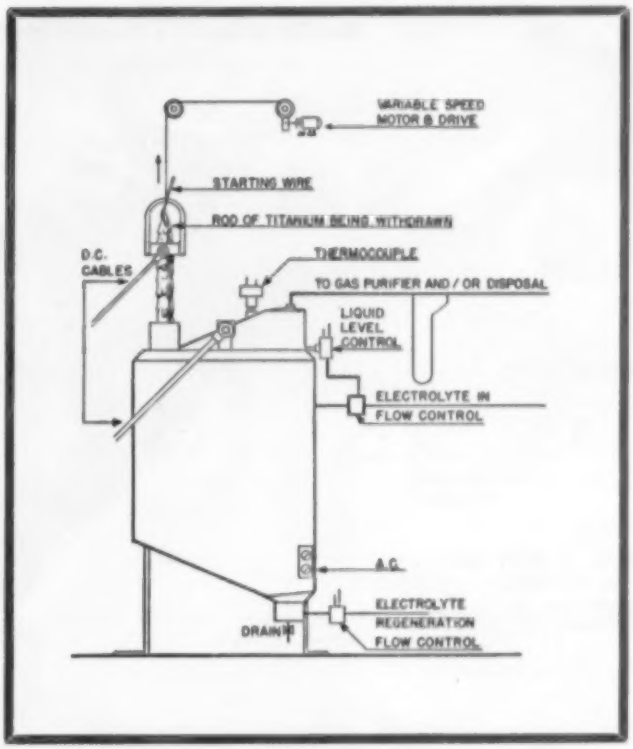
Failure to come up to limits on one or two physicals does not necessarily constitute cause for rejection. There may be compensating factors in some of the other physicals which lead Steel Inspection to believe it will perform satisfactorily. However, if it does fail, the next time similar test readings are encountered the lot will be rejected for that part.

"We believe we've got a system that will improve as our statistical records become more complete," says Mr. Beaudry. "By presenting to the vendors facts and data instead of suppositions, we've been able to enlist their full co-operation. There's no reason to believe that the system wouldn't work for many steel users," he added.

For Your File

Extra copies of this article are available in quantities from one to three until supply is exhausted. Write: Technical Editor, STEEL, Penton Bldg., Cleveland 13, O.

Titanium is plated on starting wire from low temperature molten salt in which rutile or ilmenite is dissolved. Metal is withdrawn continuously in rod form



Electrolytic Cell for Titanium

By B. W. WHITEHURST, *Manager*
Titanium Div., Hawkridge Brothers Co.
Boston

IS THE CARLYSLE cell an answer to cheaper titanium?

Conceived by Alan Carlysle, the process uses an electrolytic cell which plates titanium on a wire or rod of titanium. A starting wire is inserted into the cell. As titanium builds up, it is withdrawn continuously.

The original cell (shown in diagram) produced 50 grams of titanium in rod form per 24-hour day. It was operated 120 hours a week for over 18 months.

Recently, a 1-lb per day cell was put in operation. Plans for a 10-lb per day unit are made and engineering is in progress on a 50-lb per day unit.

Developers of the process are also thinking about commercial units that will turn out ½ to 1 ton of titanium a day.

Salt Bath—The cell uses an inorganic electrolyte operating below 400°F. It is kept at ordinary pressure and does not require an inert atmosphere. Cathode efficiency is about 98 per cent.

Feed material for the 50-gram unit was rutile, 95 per cent titanium dioxide, pretreated before it went into the cell. Because of cost reasons, ilmenite, 54 per cent titanium dioxide, is being tried as feed material for the 1-lb unit.

Here's How—A short length of titanium wire is placed in the electrolyte and the dc current is turned on. When the desired thickness of titanium plate is obtained, the wire is withdrawn slowly from the cell.

Rods up to ⅜-in. in diameter have been produced in the 50-gram unit. Nothing electrical or mechanical indicates a limit to the diameter or thickness of the titanium plate on the starting metal except physical size of the cell.

Analysis—Purity of the metal is about 99.7 per cent. Principal contaminants are: Oxygen 0.02 per cent; nitrogen 0.02; iron 0.10; silicon 0.01.

Physical tests on the deposited titanium show a tensile strength of 50,000 psi nominal; yield, 30,000 psi nominal; elongation in 2 in., 35 per cent; and Brinell hardness, 90.

The kw-hr per pound averages less than 9.4, which compares favorably with current requirements for aluminum. It is predicted that a 100-lb daily capacity unit will make titanium available at $3 a pound.

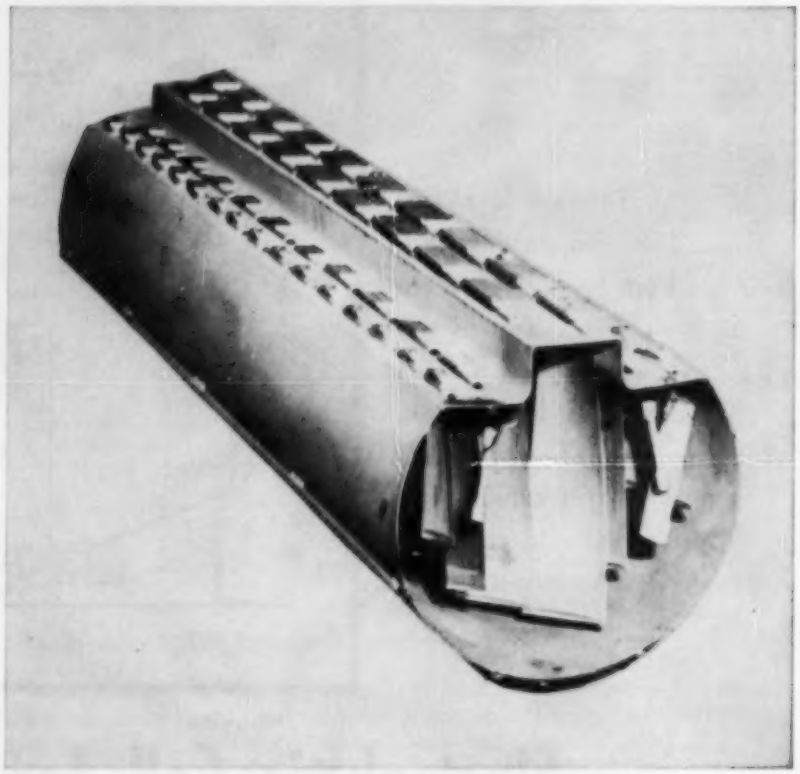
All titanium produced by the cell has been used in special purpose alloys containing up to 75 per cent titanium. Wires of copper, aluminum and tungsten, as well as titanium, have been used as starting metals.

The process may also be used for plating titanium on other metals to protect them from corrosion.

No. 13 in STEEL's Modern Heat Treating Series

Vacuum Heat Treating II

By RICHARD L. HOFF and A. M. BOUNDS
Superior Tube Co.
Norristown, Pa.



Fixture for vacuum annealing titanium-alloy compressor blades

Remove the Unwanted To Raise Performance Level

DURING VACUUM annealing, gases are distilled off. Unstable oxides and nonmetallic compounds are decomposed and removed.

Because all metals have some moisture and occluded air on their surfaces, there is frequently a rise in pressure as the furnace load is heated. During this outgassing period, pressure rises above the base pressure required (often arbitrarily set at 5 microns).

For many materials, such as stainless steel, nickel alloys and sometimes titanium, the pressure rise during outgassing is 5 or 10 microns. The system usually returns to low pressure within an hour.

More Gas—But for degassing cycles on titanium alloys containing a large quantity of hydrogen, outgassing pressure, as shown in Fig. 1, has reached as high as 225 microns and has taken up to 40 hours to return to the 5-micron level.

Part I of Messrs. Hoff and Bounds' article appeared on page 108 of last week's (Apr. 11) issue of STEEL.

The reactive metals — titanium, zirconium and their alloys, niobium (columbium), tantalum and the radioactive metals — require vacuum annealing when light sections are treated. Experience with the first two—titanium and zirconium—is considerable.

Reconsider — Since absorption and diffusion rates of nitrogen, oxygen and carbon are not too rapid up to about 1300° F in titanium and zirconium, heavy sections have been annealed in salt baths, or even in air, with minimum contamination and resultant loss in ductility.

We feel that the problem of annealing these metals has been treated far too lightly. The impression is that titanium and zirconium may be annealed by meth-

ods similar to those used for common metals. Where light sections, such as strip, tubing and wire, are involved, nothing could be further from the truth.

Takes Up Hydrogen—Up to about 1300° F, titanium and zirconium absorb hydrogen in copious quantities. Since proper annealing temperatures range from 1200° F upwards, fuel gas atmospheres contaminate titanium, zirconium and their alloys with carbon, nitrogen, oxygen and hydrogen. Hot titanium and zirconium will rapidly extract these elements from gaseous compounds.

Open annealing causes the formation of a nitride-oxide layer which is extremely hard and acid resistant.

Two Choices—For light sections, then, we must consider inert gas atmospheres or vacuum annealing. Purified argon produces a satisfactory anneal, but it is extremely difficult to prevent slight infiltration of air when argon is used in the conventional, controlled - atmosphere furnaces. This is particularly true when long thin objects are annealed through muffles, which necessarily are partially open to air at the ends.

Cost Factor—If fully sealed retorts are used, one may as well evacuate the retort instead of filling it with an expensive inert atmosphere which must be thoroughly purified.

Vacuum annealing is the logical choice for light sections of titanium and zirconium.

The deleterious effect of hydrogen (Reference 1) on titanium-base alloys has drawn much attention in recent months. Aircraft engine makers have received high hydrogen material which is not usable until hydrogen is removed.

Results—For example, the chromium-iron, titanium - base - alloy clevis forgings, shown in Fig. 2, were heat treated at 1250° F for 5 hours at a pressure of less than 5 microns. Hydrogen embrittlement was evaluated by room temperature stress rupture tests using a notched bar specimen.

The effect of vacuum annealing for hydrogen removal is shown in Table 1. Specimens from the original forgings failed in a short time at a stress of 100,000 to 120,000 psi, but the vacuum annealed por-

Fig. 2—These chromium-iron, titanium-base, clevis-pin forgings were vacuum annealed. Table 1 shows effect on stress rupture behavior. Table 2 gives effect on mechanical properties

TABLE 1

How Vacuum Annealing Affects Stress Rupture Properties (Treatment—24 hr at 1250° F)

	Hydrogen Analysis		Notched-Bar Life—Hours		
Sample	*Initial per cent*	*Vacuum Annealed per cent*	*Stress psi*	*Initial*	*Vacuum Annealed*
Front	0.036	0.003	100,000	0.1 failed	2
			120,000	0.1 failed	2
			140,000	0.1 failed	2
			160,000	0.1 failed	73.5
			170,000	0.1 failed	1.0 failed
Middle	0.032	0.003	100,000	0.2 failed	2
			120,000	0.2 failed	2
			140,000	0.2 failed	2
			160,000	0.2 failed	73.6
			170,000	0.2 failed	93.2
			180,000	0.2 failed	6.1 failed
Rear	0.032	0.003	100,000	2.0	2
			120,000	0.3 failed	2
			140,000	0.3 failed	2
			160,000	0.3 failed	28.9 failed

Notch bar tests—60 degree notch, 0.005-in. radius. Area under notch about 0.5-in. shank area

TABLE 2

How Vacuum Annealing Affects Mechanical Properties

	Tensile Strength psi	*Yield Strength psi*	*Elongation per cent*	*Red. in Area per cent*
Initial	145,000	135,500	7.5	5.16
	105,000	98,000	9.0	33.85
	118,400	108,800	11.3	23.6
Vacuum Annealed	147,500	135,500	35.6	43.4
	135,000	127,000	33.4	49.6
	135,500	131,500	42.3	50.7
Required	130,000	120,000	15.0	30.0

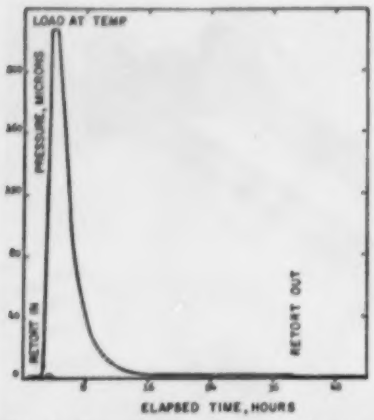


Fig. 1—Curves show variation of pressure vs. time for vacuum heat treating 343 lb of Cr-Fe, titanium-base bar stock. Temperature, 1550° F; Hydrogen content, 350 ppm

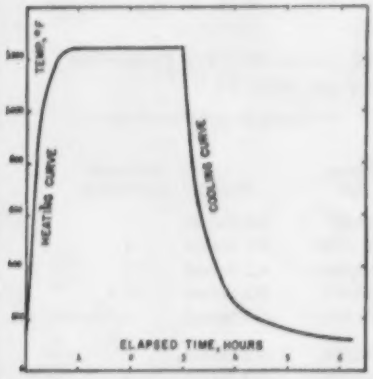


Fig. 3 — Representative heating and cooling curves for vacuum annealing production quantities

tions of the same forgings withstood 160,000 psi from 29 to 73 hours.

Test Tip—Tensile tests frequently fail to show the effects of hydrogen on titanium alloys. But when such bars are tested at extremely slow rates of strain (such as 0.005 ipm), a reliable indication of hydrogen embrittlement is obtained (Ref. 2) as shown in Table No. 2.

The vacuum annealed portions of these forgings broke at a reduction in area of about 50 per cent, compared with initial forgings which failed with an 8-to-10-per-cent reduction.

Jet Blades—Finished titanium-alloy compressor blades are vacuum heat treated using the fixture shown at top of page 108. It was designed to hold each blade vertically to minimize distortion.

Miniature notch bar specimens machined from these blades after vacuum treating withstood 150,000 psi for 5 hours. Before vacuum treatment, the blades were too notch sensitive to be used safely.

Wire—Some time ago a producer of titanium brought us some 0.020-in. wire which could not be drawn farther. It had been air annealed a number of times; the surface was badly contaminated.

After this wire was vacuum annealed, it was drawn without difficulty to 0.007-in. in diameter in a series of 20 to 30-per-cent drafts (with intermediate vacuum anneals). It could have been drawn much farther.

We do not imply that vacuum annealing will cure the embrittling effect caused by gases in the reactive metals; in this wire, contamination had not gone so far as to embrittle the material completely. If it had been vacuum annealed from a section size of perhaps ⅛-in. in diameter down, a finer and more ductile product would have resulted.

No Change—A series of high nickel alloys for electronic use was processed in vacuum. Results were compared with the usual procedure of annealing in dissociated ammonia.

Spectrographic analyses were made to see if any of the deoxidation residuals, such as magnesium or any of the reactive metals which had been added, were removed.

We found that vacuum annealing retained the carbon content of the original metal intact. The usual protective atmospheres removed about two-thirds of the carbon content before the material reached finished size.

Thirteen other elements were determined at several stages during processing. They were not significantly affected.

P-H Alloys—In a similar way, solution and precipitation-hardening treatments of several of the age-hardening alloys were done in vacuum. Vacuum will prevent the conversion of titanium, aluminum, beryllium, etc., to gas-metal compounds in materials such as beryllium-copper, K-Monel, Inconel-X, Ni-Span-C, the Elinvar-type alloys (42 per cent nickel, 5 chromium, 2½-titanium) and the cobalt-base, beryllium-containing alloys.

How Fast—The question of heat transfer rate inevitably arises when vacuum heat treating is considered.

The answer is found in Fig. 3. It shows representative heating and cooling curves for vacuum annealing of production batches at Superior Tube Co.

The heating rate of the charge is quite adequate up to 1000° F where it slows down somewhat. Likewise, the cooling rate slows down at about 400° F. Much of the sluggishness in cooling is due to the mass of the retort itself rather than the effect of vacuum.

Limitations—Vacuum techniques are generally applicable only in batch-type work. But continuous vacuum furnaces are a theoretical possibility. Some attempts in that direction are under way.

The rapid transfer of work required in quenching is difficult, although it can be accomplished.

There still are difficulties in the accurate measurement of the degree of vacuum. One is apt to find that three different pieces of equipment give three different readings on the same evacuated vessel.

Drawback—Perhaps the biggest disadvantage of all at the moment is the lack of understanding concerning the operation of vacuum equipment — management, shop people and even some engineers are involved.

Vacuum equipment is frequently less complex and actually more economical (in first cost and continuous operation) than methods employing prepared atmospheres.

Vacuum has been out of the laboratory and in the shop for some time. The remaining task is merely a matter of getting used to handling a new set of tools, and using them to their best advantage.

For Your File

Extra copies of this article and part I, which appeared last week, are available in quantities from one to three until supply is exhausted. Write: Technical Editor, STEEL, Penton Bldg., Cleveland 13, O.

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This article is based on a talk used in a Vacuum Metallurgy Symposium at the 106th meeting of the Electrochemical Society at Boston.

Porcelain Insulators container saves 25% of over-all packaging costs. High finish, hard-to-pack items like these become easier to pack with positive product protection in General Box engineered containers.

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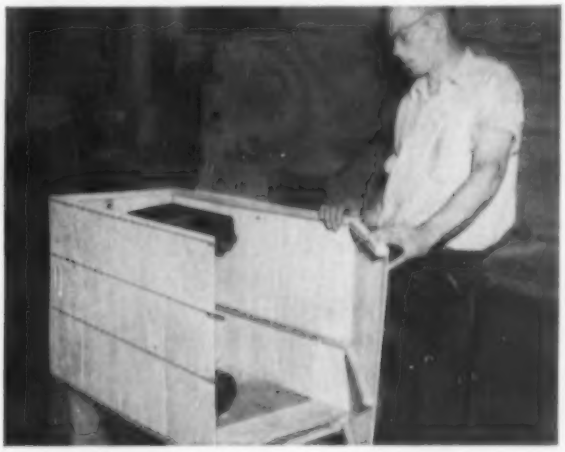

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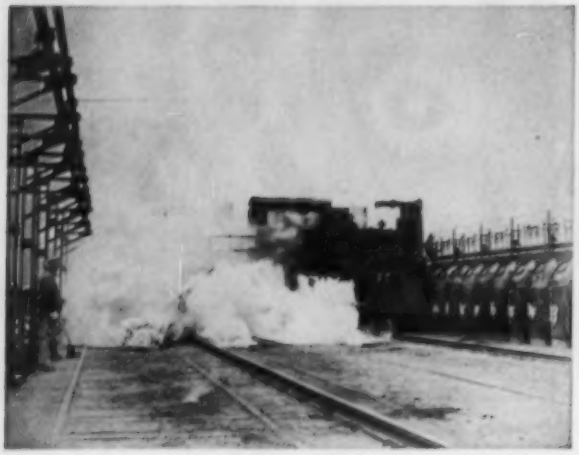


This is a typical "before" shot during the charging cycle

There's still some smoke, but the "after" scene is better

Cleanup at the Coke Ovens

That's what American Steel & Wire accomplished with a new charging car installation. Now rich charging fumes go into the collector system, not the neighborhood

Close-up shows tight-fitting sleeve that fits over the charging hole. Note the horizontal smoke collector that connects all four charging hoppers

AIR POLLUTION control officials and civic leaders have put the stamp of approval on American Steel & Wire Div.'s rebuilt coke plant in Cleveland's industrial valley. And well they should.

Gone are the periodic billows of brown smoke which signaled the neighborhood that another oven was being charged. There probably never will be a completely smoke-free coke and coal chemical plant, but American Steel & Wire has cut smoke discharge about 75 per cent.

How—Complete rebuilding of the 180 ovens in the four batteries helped considerably, but the real air polluters were the 4-minute charging cycles. Dumping 12½-tons of powdered coal into the white-hot ovens sets up an ignition reaction that used to create a fume cloud for about 4 minutes—until the charging car was backed off and the charging hole covers were replaced by the lidmen.

Two specially built larry cars just put into operation really stymie the smoke—and, incidentally, divert the chemically rich initial combustion products into the recovery system. Special sleeves fit tightly over the covers during charging, and a steam jet aspirator in the ascension pipe creates a vacuum which pulls fumes into the collector mains.

Quick Closing—Since coal piling in the center of the oven might choke off this draft, all four coal hoppers on the larry car are connected into the aspirator system. This prevents smoke and fumes from backing up through the sleeves and out the hoppers.

The tight fitting sleeves also eliminate most of the coal spillage around the charging hole, so lidmen can clean up and close the charging ports in much less time after the car moves away. Ports used to be open during the entire 4-minute cycle, but now they're open only about 80 seconds.

This smoke control idea originated at the Tennessee Coal & Iron coke ovens shortly after the war. It has been incorporated at several other divisions of U. S. Steel Corp. Atlas Car & Mfg. Co., Cleveland, supplied the charging cars to American Steel & Wire specifications.

WAYLAND,
THE SAXON SMITH

Familiar to every Englishman of King Arthur's day was Wayland the Smith . . . maker of a mighty sword for Merlin the Magician. The legendary metalsmith escaped from Norway by forging himself a pair of wings. Soaring to freedom, he set up his forge in the Berkshire hills. If anyone had a tool to be mended or a horse to be shod, he left it with sixpence at Wayland's cave, and the versatile smith accommodated him promptly.

Crafts and craftsmen through the ages

NUMBER FOUR OF A SERIES

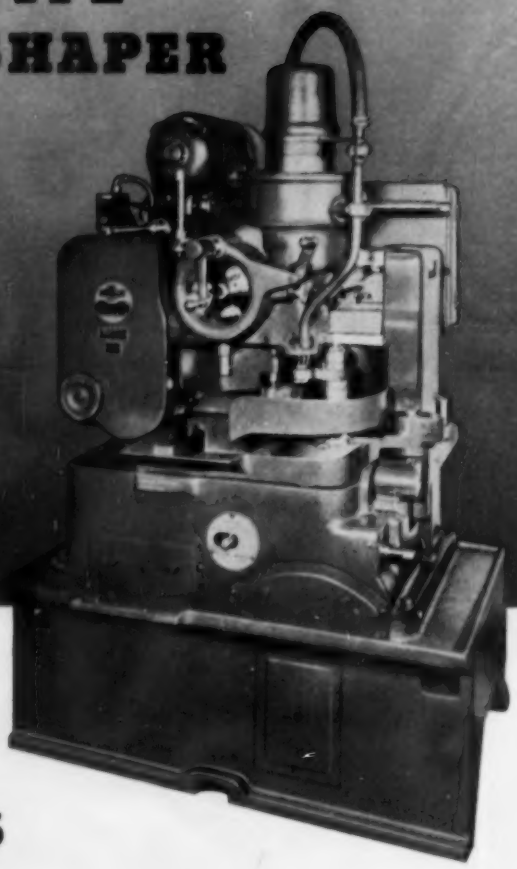
Basic Refractories not only furnishes its customers with the finest refractories available, but also employs skilled craftsmen — men with practical steelmaking experience — to insure that the use of these products gives full value.

BASIC REFRACTORIES INCORPORATED CLEVELAND 15 OHIO

REFRACTORIES ENGINEERING AND SUPPLIES, LTD. — EXCLUSIVE CANADIAN AGENTS

FELLOWS 7A-TYPE GEAR SHAPER

7A



Approved by Gear Men for 1955

Dollar for dollar, the Fellows No. 7125A Type Gear Shaper has long proved a sound investment for *any* shop that requires high speed gear production within its size capacity. This machine scores high on all counts:

VERSATILITY... produces spur and helical external gears up to 7", internals up to 6" p.d., as well as cams, racks, face gears, many special contours.

SPEED... cuts production costs on both long and short runs.

PRECISION... holds close tolerance even while taking substantial cuts.

FAST SET-UP... and rapid change-over allows you to get more production from the machine.

DEPENDABILITY... like *all* Fellows Gear Shapers!

CALL IN your Fellows Representative for data about the complete Fellows "line-up" ... plus facts about the Fellows Plan for deferred payment. WRITE, WIRE or PHONE any Fellows Office!

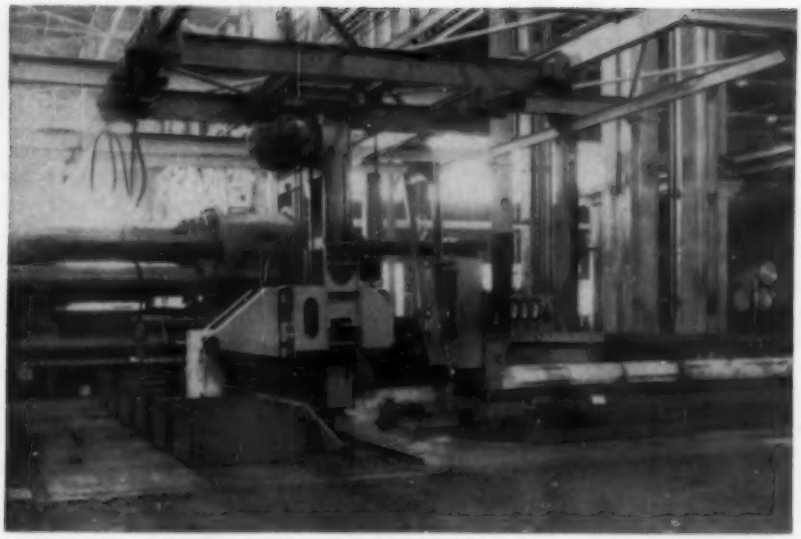
THE Fellows GEAR SHAPER COMPANY

Head Office and Export Dept., 78 River St., Springfield, Vt.

Branch Offices: 319 Fisher Bldg., Detroit 2, Michigan • 5835 West North Avenue, Chicago 39, Illinois
2206 Empire State Bldg., New York 1, N. Y. • 6214 West Manchester Avenue, Los Angeles 45, California

INGOT CRANE

Stands Them Up, Lays Them Down



Carriage lowers ingot into furnace. At right are billets coming from storage area

INDUCTION HEATING of aluminum ingots at Aluminum Co. of America's Lafayette, Ind., plant posed a difficult handling problem.

Ingots delivered to the furnace-room in a horizontal position had to be upended for insertion into the furnaces. After heating, they had to be returned to the horizontal and carried to the feed table of a 14,000-ton extrusion press.

Solution—Needed was equipment which could carry the ingots through these changing positions mechanically. Alcoa installed a Chicago Tramrail Corp., Trak-Rak crane with special built-in features. Now, all movement is accurately controlled by one operator with a pendant pushbutton control.

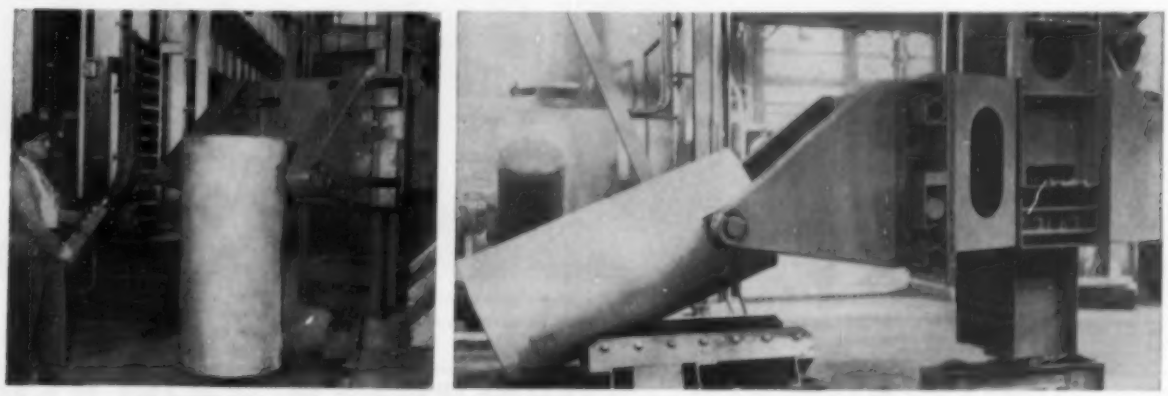
The installation consists of an overhead, underrunning, double-girder bridge (5000-lb capacity) mounted on a 60-ft runway. Crane span is 16 ft. Electric solenoids operate in location holes along the runway to center the bridge over each of the six induction furnaces.

Hoist—A hoisting column which can be rotated 360 degrees is rigidly attached to the bridge beam. An electric winch with a capacity of 3 tons lowers and raises the ingots.

Mounted on the column is a carriage with hydraulically operated arms. Spiked plates set in a trunnion at the end of each arm are weighted on the bottom so they are always in proper relation to the ingot. When pressure is applied the arms move in, grasping the ingot securely. Carriage and arms can be moved vertically on the column from 1 ft 11 in. above the floor to 10 ft 11 in. above it.

Operating Cycle—Ingots move into the furnace area on four conveyors. The carriage lowers into position over a conveyor, arms grab the ingot and raise it the distance required to clear the conveyor. The column rotates the ingot over the row of furnaces, and the bridge moves in the required direction to position it over the selected furnace into which the ingot is lowered.

After heating, the crane moves into position over the furnace, arms grab the ingot and raise it. The bridge moves the length of the runway to lower the ingot horizontally onto the turntable or section of another conveyor. It moves through a 90-degree arc to the feed table of the extrusion press. A feed table rotation of 45 degrees places the ingot in position to enter the press.

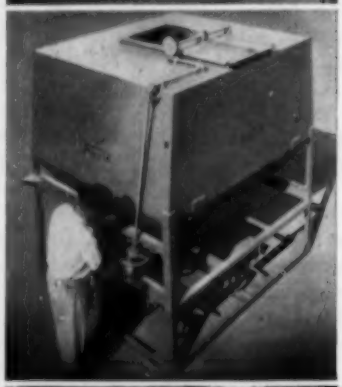


Held securely between trunnions (left), billet is laid down on conveyor turntable after heat treating (right)

Briefly, this ad illustrates why DEMPSTER-DUMPSTER SYSTEM

Container at right has cast iron bottom and inside walls are lined with fire brick. It handles hot skim off aluminum.

This Tilt Type Container was the result of a cost-cutting idea whereby a high temperature dusty product would be handled by a plant's Dempster-Dumpster. Container has cooling flues, counter-balanced hinged lid with 3-way locking device, 16" sliding gate valve and two sight-glass inspection openings.



Here is a Hopper Type Container with a top door for filling and two bottom discharge doors operated by rack and pinion. Another case where the Dempster-Dumpster System was applied to an additional problem to further reduce costs.

Container at right is just one of several different types we have designed to handle equipment, materials, packages, parcels, etc.

IN A NORMAL INSTALLATION the Dempster-Dumpster System is purchased by a plant because of its proved record for handling bulk materials at tremendous savings. This normal installation usually includes one truck mounted Dempster-Dumpster and any number of standard containers designed to meet the various requirements within the plant. In some cases, containers number 40 to 50. These containers can range in capacity up to 21 cu. yds., with all containers served by the one Dempster-Dumpster.

In the great majority of cases this basic installation is just a starter. Management men, constantly looking for lower operating costs, find numerous and amazing extra savings in the Dempster-Dumpster System. Once in service, transporting developments of every description come to light that supplement the original functions of the equipment. Your own men find easier, quicker and additional cost saving ideas for its use. Many even overshadow the original savings and the equipment becomes more and more indispensable.

Look over just a few of the "Special" containers illustrated in this ad. They are all the result of rough ideas that originated with the men in plants after a basic installation, then developed by our engineers. All ideas were stimulated by the powerful Dempster-Dumpster and its flexibility in picking up, hauling, setting down or dumping anything that needs transporting, at lower cost.

One man, the driver, and a few simple hydraulic controls in the cab of a Dempster-Dumpster, will become indispensable in your plant. It is just that in hundreds of plants of every description throughout the nation. Let one of our representatives give you details of installations. Manufactured exclusively by Dempster Brothers, Inc.

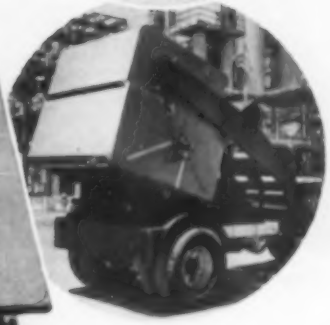
Above container is built with cast iron liner. The holes in outer wall are for cooling.

Here is one of several special drop bottom type containers equipped with couplers and ball bearing trucks for operation in train on rails.

THE DEMPSTER DUMPSTER SYSTEM

DEMPSTER BROTHERS

so many plants find the indispensable...



Two photos above show how all containers, regardless of design, are picked up and hauled. At destination materials are dumped from drop bottom containers as shown at left . . . from Tilt and Skip Type Containers by tilting. Any load, of course, may be set down intact.

This is a special adaptation whereby waste zinc slurry is pumped into two containers, which serve as settling tanks, enabling majority of the water to be decanted before sludge is transported and dumped at waste basin.

Tank Type Containers are available with or without casters in steel, aluminum, stainless steel, etc. Capacity ranges up to 1,200 gal. They may be lined with rubber, lead, highly resistance coatings, etc.

This is a master container with three 2 cu. yd. insert containers. Each insert container is provided with casters, counter-balanced spring-hinged lid for loading and dumping.

645 DEMPSTER BLDG., KNOXVILLE 17, TENNESSEE

These stainless steel television cones are polished electrolytically. Glycerine in the bath helps to . . .

Smooth Out Metal Processing

ELECTROLYTIC metal treatments are using more glycerine. That's the word from the Glycerine Producers' Association.

Electropolishing solutions use the most. Research sponsored by the association showed that glycerine prevents etching of the metal surface.

What It Does—Electropolishing smoothes and polishes a metal product by removing the outside layer. Technically, it's the reverse of electroplating. The part to be polished is made an anode in the electrolyte. Removal of metal from the piece levels raised areas to polish the surface.

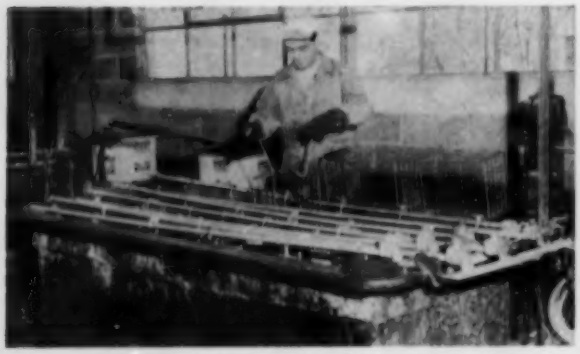
The electropolished surface comes out clear and brilliant. It shows up the true metal color.

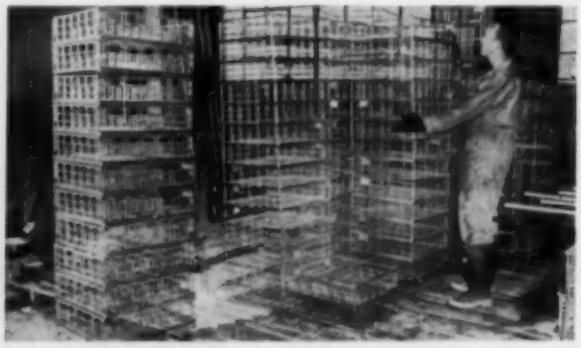
Unique — Electrolytic polishing does an important job on work that cannot be readily polished by mechanical methods. Parts containing recesses, welded wire structures, such as refrigerator shelves and small parts that are difficult to hold against a polishing wheel, are examples.

Sulphuric and phosphoric acids (alone, mixed with organic acids or used with additives) form the basis of a variety of electropolishing baths.

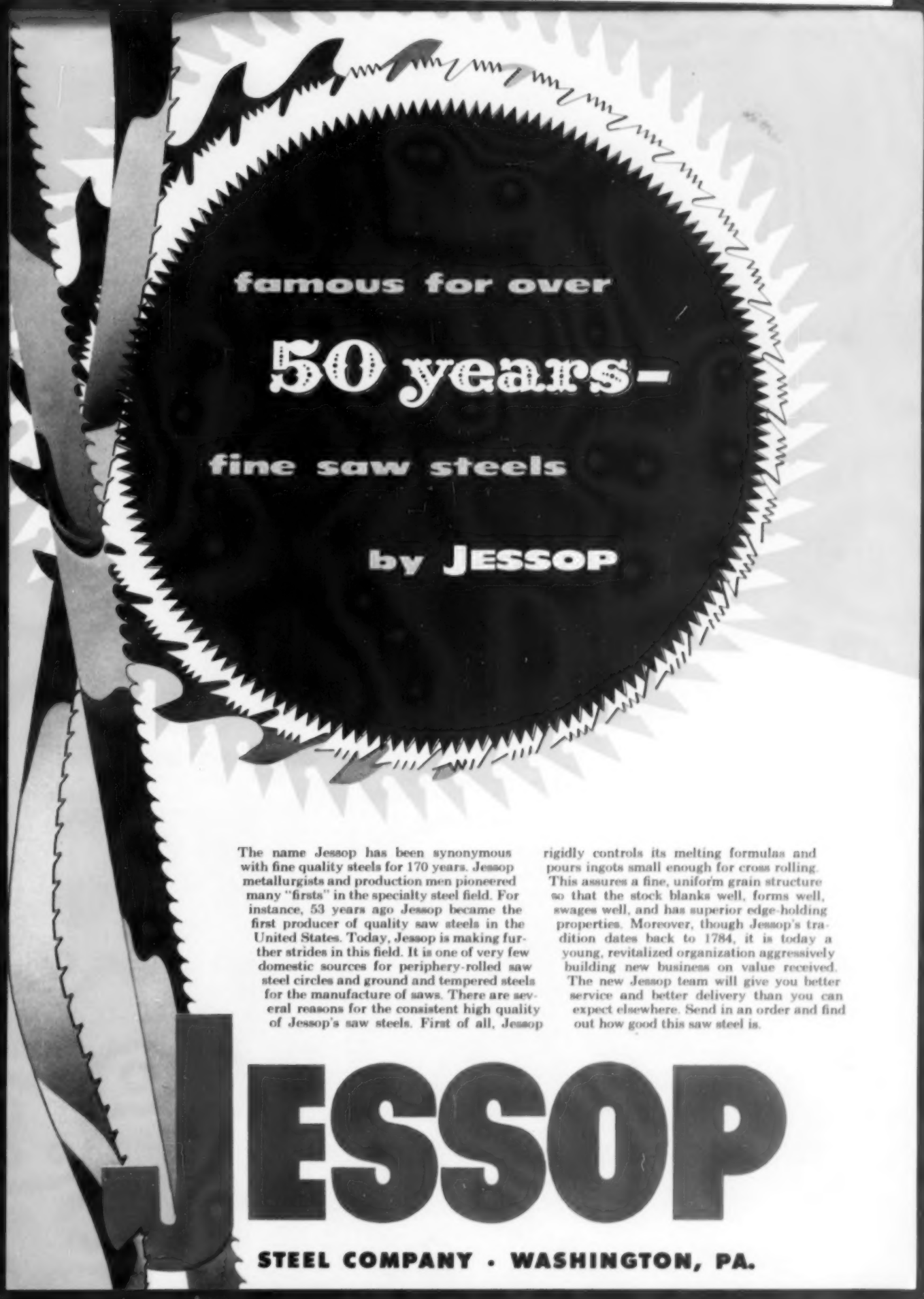
Deburring—The same principle that forms the basis of electropolishing is also used in electromachining and electrodeburring. An electrolyte consisting of 25-per-cent commercial hydrochloric acid and 75-per-cent glycerine by volume (U. S. patent 2,382,549) is used for accurate sizing of parts and removal of burrs and machine marks.

Current density of 0.1 amp/sq in. of surface being treated is recommended for steel parts.





(Left) Stainless steel baskets for dishwashing machines go into electropolishing tank at Electro-Glo Inc., North Arlington, N. J. (Right) Polished racks are stacked on draining boards after rinsing. Polishing bath is of the phosphoric and sulphuric acid type, modified by a combination of organic chemical additives



The name Jessop has been synonymous with fine quality steels for 170 years. Jessop metallurgists and production men pioneered many "firsts" in the specialty steel field. For instance, 53 years ago Jessop became the first producer of quality saw steels in the United States. Today, Jessop is making further strides in this field. It is one of very few domestic sources for periphery-rolled saw steel circles and ground and tempered steels for the manufacture of saws. There are several reasons for the consistent high quality of Jessop's saw steels. First of all, Jessop rigidly controls its melting formulas and pours ingots small enough for cross rolling. This assures a fine, uniform grain structure so that the stock blanks well, forms well, swages well, and has superior edge-holding properties. Moreover, though Jessop's tradition dates back to 1784, it is today a young, revitalized organization aggressively building new business on value received. The new Jessop team will give you better service and better delivery than you can expect elsewhere. Send in an order and find out how good this saw steel is.

JESSOP

STEEL COMPANY · WASHINGTON, PA.

TORRINGTON HEAVY DUTY NEEDLE BEARINGS *are used in a wide variety of machinery, including cranes, oil field equipment, hydraulic pumps, air compressors and machine tools.*

TORRINGTON Heavy Duty Needle Bearings

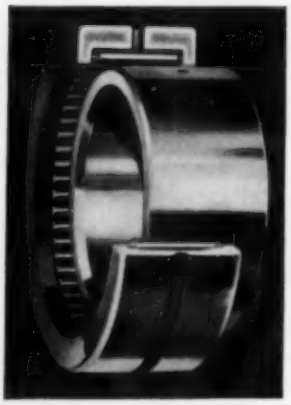
are designed and manufactured to give added strength—for long economical service

Even a casual look at the TORRINGTON HEAVY DUTY NEEDLE BEARING suggests strength—the one-piece channel construction, the sturdy roller ends and integral side flanges.

Carburizing-grade nickel steel is used for both inner and outer race, giving a harder, more wear-resistant surface, and a tougher, shock-absorbing core.

Accurately ground raceway and side flanges eliminate drag at roller contact and keep rollers in a true path.

These are some of the reasons why TORRINGTON HEAVY DUTY NEEDLE BEARINGS have earned the confidence of leading machinery builders and users in many industries. Specify these rugged TORRINGTON bearings and get top performance, low maintenance service in your equipment. They are available from stock in a complete range of sizes.



THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON HEAVY DUTY NEEDLE **BEARINGS**

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

Four spray lines give full coverage over the tool's cutting edge

Coolant Spray Doubles Output

In machining cast aluminum the workpiece galled, chips welded to the tool and cutting speed was low. But a spray coolant system fixed all that

ROUGHING and finishing a straight ribbon tread on the inside of a three-piece, cast-aluminum, tire-capping mold, 90 in. in circumference, used to be done at a surface speed of 45 fpm at the Mfg. Division of O. K. Rubber Inc., Littleton, Colo. Now it's done at 75 fpm.

The tread is cut on a vertical turret lathe by two, one-piece, face-form tools, one for the rough cut, the other for finish cut. At first, the company tried the job with no coolant, then compressed air. With both systems, the aluminum casting was galled, and there was heavy welding of chips to the cutting edge of tools.

Solution—By installing a coolant spray system, the company increased surface cutting speed to 75 fpm, eliminated welding of chips to tools and greatly reduced tool maintenance. Galling of the workpiece no longer occurs.

The control panel and liquid reservoir are centrally located for use on several machines. A mixing valve is mounted on the side of the vertical turret lathe for convenient spray regulation. Two solenoid valves installed ahead of the mixing valve start and stop air and liquid flow to conform to the machine's operation. Called Norgren Spray-Lube, the system is made by the C. A. Norgren Co., Englewood, Colo.

Spray Tubing—Two ⅜-in. copper lines 30 ft long supply the mixing valve. From the mixing valve, 14 ft of ⅜-in. hose, with a quick-connect coupling, connects to a small manifold on the tool post. Four spray lines of 3/16-in. copper tubing, 12 in. in length, attached to the manifold are positioned to give full spray coverage over the cutting edge of the tool. Each of the two tools is equipped with a quick-connection, small manifold and four spray lines.

Dypral Safety Coolant (mixed 1 to 15 with water) is used. Air pressure settings at the control panel are 60 psi on the air line and 62 psi on the liquid line.

Automatic Conveyor Tongs

They handle partially assembled engine blocks in an automated production line

SEVENTY PAIRS of automatic tongs provide speedy handling of engine blocks at the new Pontiac, V-8 engine plant.

Carried by a power-and-free conveyor, the tongs pick up partially assembled engine blocks, deliver them to machines in which their crankshafts are drilled to balance, and then pick them up and carry them to the next operation.

Jaws of the tongs are shaped to fit the engine blocks, so that each block is held firmly but not damaged. The tongs weigh 40 lb each and have a capacity of 400 lb.

Automatic Loading—To load the tongs, an engine block is pushed up into the jaws. This trips the automatic mechanism of the tongs and their jaws close on the block. At its destination, the block is again pushed up. This locks open the jaws, the block is released and the tongs are ready for their next load.

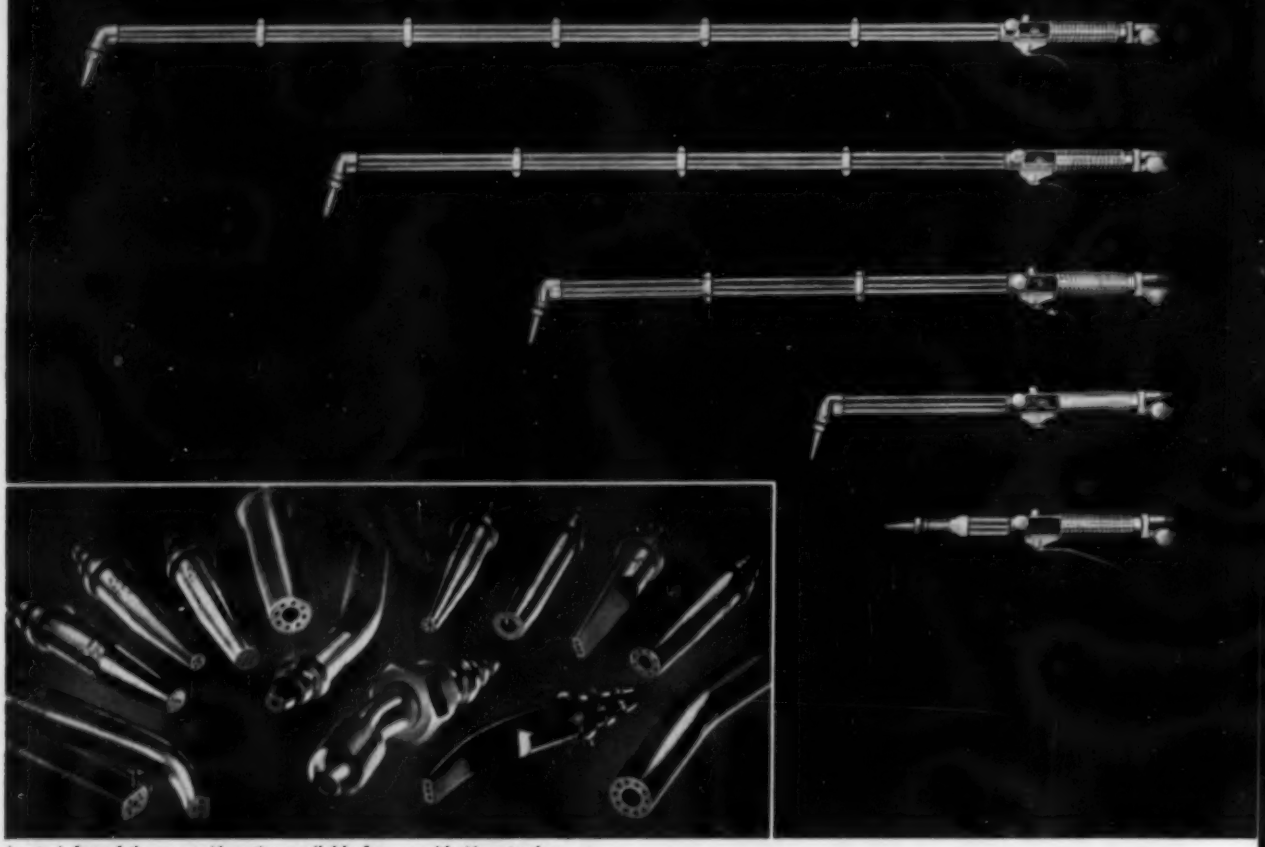
Tongs pick up blocks after the initial assembly, at which stage each block contains its crankshaft, camshaft, piston and connecting rod assemblies. They are delivered to Gisholt Dynetric balancing machines where rotating and reciprocating parts of the engines are dynamically balanced.

AUTOMATIC TONGS
. . . deliver block to balancing machine

Continuous Operation—As soon as one of the balancing machines becomes free, tongs on the conveyor line carry another block to it. When the balancing operations are completed, the block is carried away along the conveyor line.

The tongs were designed and made by Heppenstall Co., Pittsburgh.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND.....



Inset: A few of the many Airco tips available for use with Airco torches.

Airco Cutting Torches...from 13 inches to 6 feet in length!

The Airco 9000 series hand cutting torches are designed to make short work of jobs in scrap cutting, rivet washing and general maintenance.

Here's flexibility at its finest. Torches range from the 13-inch length for working in confined areas to the 72-inch length for keeping heat and fumes at a distance and include the standard 21-inch model. Torch heads are available with 45°, 75°, 90° and straight heads—your choice of monel or bronze.

An extremely wide selection of cutting tips, (over 25), make them adaptable for cutting metal thicknesses from sheet metal up to 12″ steel. Tips are available for cutting with acetylene, propane, or natural gas.

Companion accessories include the Airco Flash Circle Burner which is adjustable to cut circles 2½″ to 17″ in diameter. This unit can also be used with all cutting attachments and machine cutting torches.

See your Airco representative or Authorized Airco Dealer for detailed information and assistance —or—write Airco direct. Request Catalog 818.

AIRCO

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

Represented internationally by Air Company International

Foreign Subsidiaries:
Air Reduction Canada Limited
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Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO—industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO—carbon dioxide, liquid-solid ("DRY-ICE") • OHIO—medical gases and hospital equipment • NATIONAL CARBIDE—pipeline acetylene and calcium carbide • COLTON—polyvinyl-acetates,—alcohols, and other synthetic resins.

AN AIR REDUCTION PRODUCT

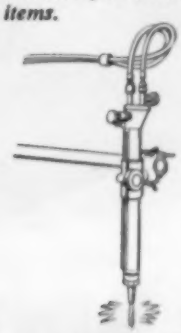
AIRCO items for flame cutting

The Airco 3000 Series Cutting Torches have the same rugged design features as the 9000 Series (shown at left). The principal difference is that the high-pressure oxygen control mechanism is designed so the cutting oxygen can be eased on gradually. This is particularly helpful in hole piercing, rivet washing, or rivet and stay bolt cutting.

The 3000 Series is also suitable for general purpose cutting of steels ranging from thin gauge to 12" thicknesses.

Airco two-hose and three-hose machine cutting torches are designed for use with standard Airco tips. The two-hose torches are for light and medium machine gas cutting primarily with Airco portable gas cutting machines like the Radiagraphs and Monographs.

The three-hose torches are for use with large Airco shape cutting machines such as the Duograph, Oxygraph, and Travograph. *Write for literature on these items.*



WELDING SHOW VISIT BOOTH 254

MACHINE TOPICS

By R. P. HUBER, *Machine Tool Editor*

CONTRARY to rumbles in and out of Washington, the Air Force has not issued any orders on its $84-million reserve machine tool program.

Best bet now is that no orders will be placed until after the first of May. There are still some details to be worked out.

Despite the delay, most everyone concerned still believes the program will be completed (all $84 million spent) during 1955. The machines still are slated to go into storage. Exceptions might be specials that go to a plant for shakedown and trial run.

Types — The list of machines to be purchased has been drawn up. The information is classified, but it's a good guess that a fair share will go for milling machines. The large number of mills used by airframe makers is the tipoff here.

A sidelight on this—the co-operative effort between some milling machine builders and the aircraft industry has resulted in a set of standard specifications. The report—to be printed and issued in May—will be available for purchase.

Now under way: A similar program covering stretch-wrap presses.

Lathes

Some of the major builders of engine lathes are continuing work on standardization of capacities. Their meetings are held behind closed doors—have produced no standards, and none seems forthcoming.

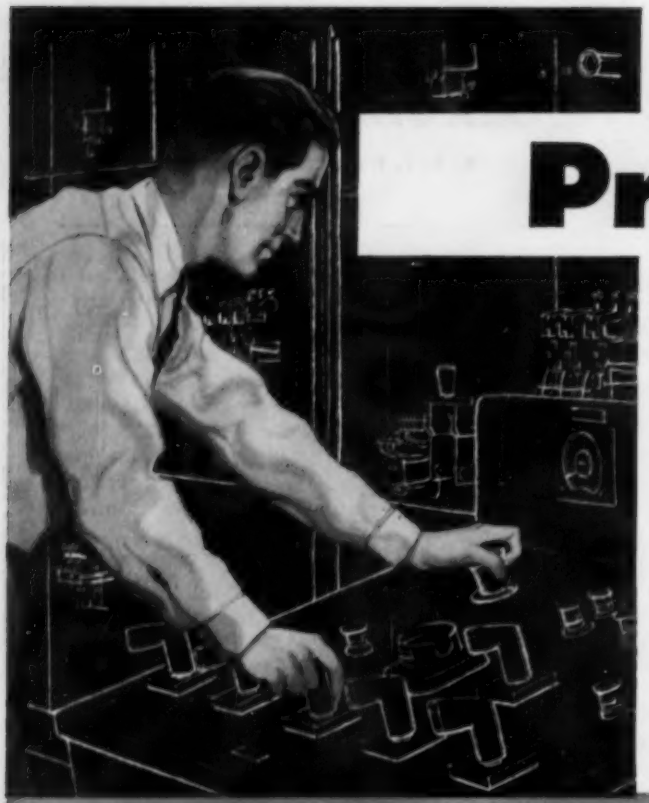
Here's the picture on their problem. Actual capacities (swing over cross slide, etc.) of lathes with the same "size" listing may vary several inches. A machine tool buyer who's looking for a 16-in. lathe may find competitive models with swings of 12, 13, 10 in. etc. He may find that to do his job, he'll have to buy a 16-in. model from one builder or an 18-in. model from another.

Tough Switch — While a standard system for listing lathe capacities would simplify his job, getting the standard itself is not so simple. Say you pick a set of figures like the proposed "preferred number" series. This calls for lathes to be designated as 10, 13, 16, 20, 25 and 32 in. They'll swing, respectively, 7, 10, 13, 16, 20, 25 in. over the cross slide.

For the builder who has been marketing lathes on another size system, the job of switching to the new standard may involve a complete redesign of his line. To raise or lower the capacity of a lathe by 1 in. may mean a new head casting and a new bed. At best, he'd probably figure on swinging into the new scale slowly—do it as each model came due for change.

Another reason for foot dragging is some builders enjoy a healthy competitive edge in some models—would lose it if all builders made the same few sizes. These days, nobody is anxious to deliberately lose a competitive advantage.

For these reasons, progress is slow, sometimes faltering, but apparently always toward a standard of some kind.



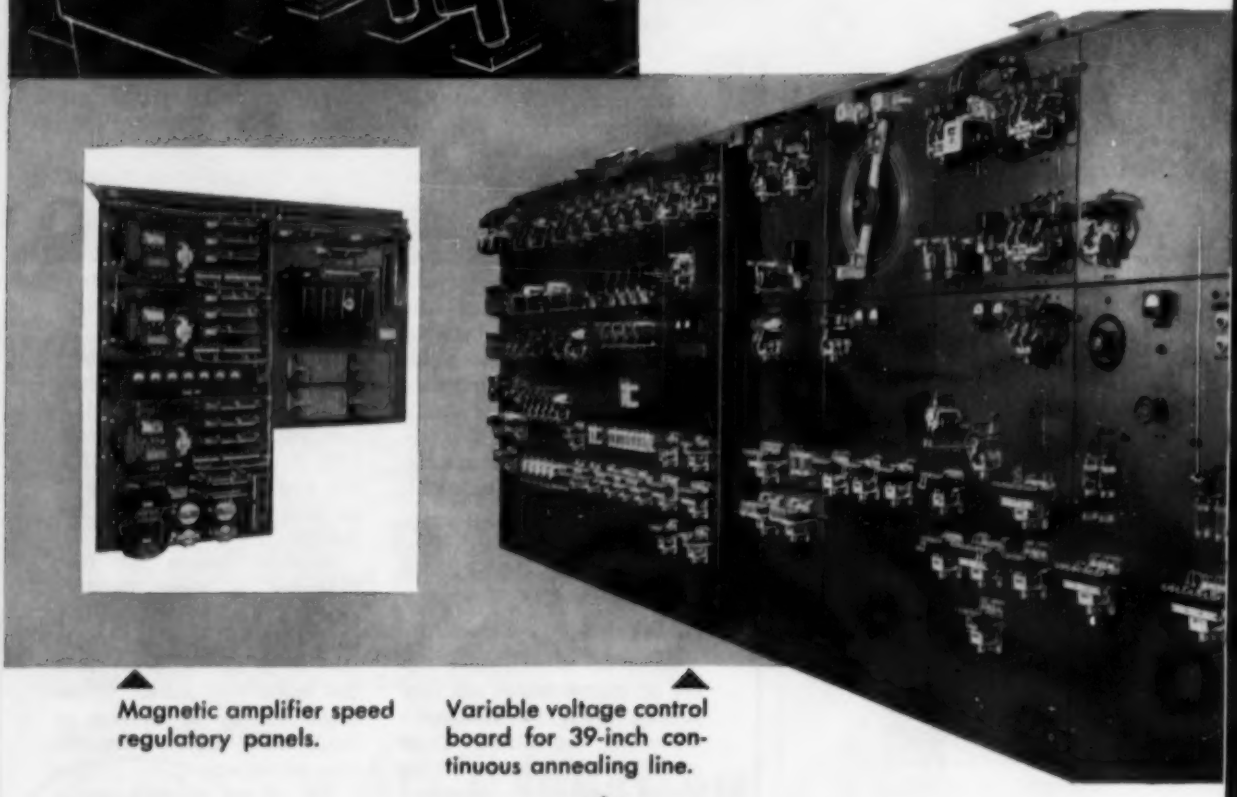
ALLIS-Processing

Allis-Chalmers constant potential and variable voltage systems are providing dependable precision control in many of the nation's largest mills.

When you modernize

to meet the double challenge of a growing market and heavy competition, take advantage of Allis-Chalmers experience. See your nearby representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4659



Magnetic amplifier speed regulatory panels.

Variable voltage control board for 39-inch continuous annealing line.

ALLIS-

CHALMERS
Line Control

Entry section control board for pickle line.

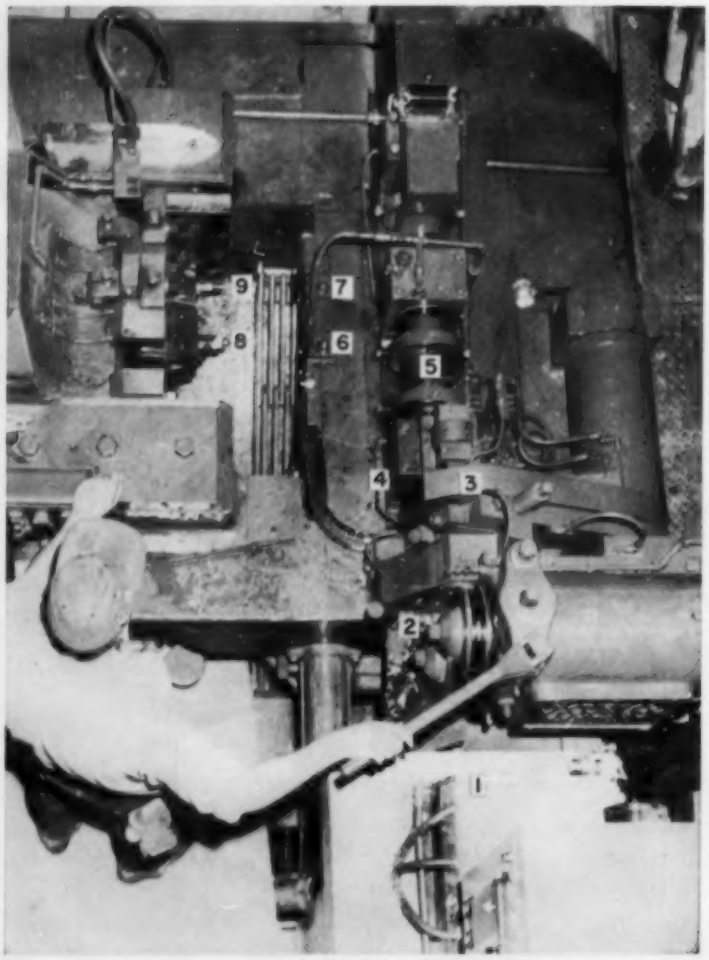
Delivery section control board.

Delivery end operator's desk, stainless steel top.

Riveter's cabinet, stainless steel front.

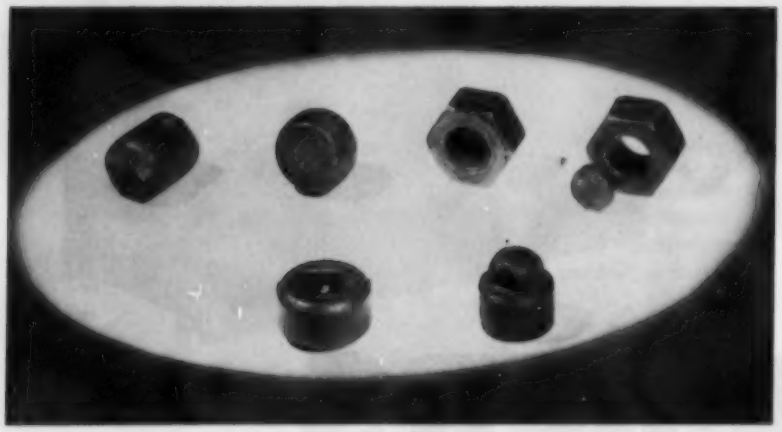
CHALMERS

1. Final heating coil
2. Feed rollers
3. Cut off
4. Bumping station
5. Bumper
6. Crowning station
7. Piercing station
8. Crowning punch
9. Piercing punch



Induction heating teams with husky new machines for . . .

Nut Forging, Hot and Heavy



Hot forging steps from slug to nut blank. The machine makes pipe plugs too

NUT FORGING has an international flavor at Lamson & Sessions Co., Cleveland. There's a touch of the Dutch and a dash of German in its newest nut production lines.

But the motive is typically American—a better product in less time at lower cost. The bulk of the machinery in the line is American. So is the ingenuity, which shows up first in the stock rack.

Automatic—Nut stock in 24 ft lengths rolls from a rack down a slight incline until it hits a stop. From here lengths are flipped one at a time by metal fingers into position for heating. As a length

of stock enters the heating units, a solenoid switch triggers the finger mechanism to flip another into line behind it.

Stock is round (not hex), and usually carbon steel bar, but the line will handle stainless or nonferrous with equal ease. From the rack it moves directly through three Tocco induction heating coils (a second line, just installed, uses Westinghouse heating units). Any or all of the coils may be energized, depending on the heat required.

Hot Forged — Feed rollers on the nut former pull the stock through the coils. Here's where the Dutch comes in. The nut forging machine, built by National Machinery Co., Tiffin, O., springs from a long line of Van Thiel hot-nut-forging equipment in use in the Netherlands for many years. National has done a considerable refining job for the American market.

First step past the feed rollers is a shear. It lops off a red-hot blank which is immediately upset by a bumper. The upset blank slides down a chute to the forming stations. If the blank from the end of a bar is too small, an automatic device flips it down a scrap chute, and it never enters the bumping station.

Forming is in two steps: Crowning which forms the hex shape and indents the center, and piercing which punches out the center blank.

Quench and Thread—A conveyor picks up the nut blanks from the piercing station, carries them through a quench and dumps them into tote boxes, ready for tapping. Scrap is automatically segregated.

The sequence ends on an international note. Nutap automatic tappers, made by Schuhl & von den Steinen Maschinenfabrik, Hagen, Germany, cut the threads.

Capacity of one line is ¾-in. regular to 1½-in. heavy, square or hex nuts at a rate of 75 a minute. The second line turns out ½ to ¾-in. heavy nuts at 100 a minute. The lines haven't been in operation long enough for complete cost figures to be gathered, but the way things are going now, it looks like they'll write themselves off the books in three years.

With the ultrasonic attenuation analyzer . . .

Fatigue Draws Its Picture

A NEW TOOL in nondestructive testing's bag of tricks goes by the mouthfilling name, ultrasonic attenuation analyzer. Its use: to spot fatigue in metals before it shows up in failure.

Unlike more familiar types of ultrasonic testers which use pulse echoes to pick up flaws, this one uses the attenuation or dying out of the signal to gather information. Results are interpreted by comparison with predetermined standards or by comparing information from repeated observations of the same specimen.

Fatigue Finder — If a piece of metal is subjected to repeated or continuous strain, the attenuation and velocity of ultrasonic pulses are modified during successive tests. By applying frequent measurements to a metal structure suspected of fatigue, the beginnings of plastic strain can be detected before it becomes critical.

This opens possibilities of using the analyzer for trouble shooting and preventive maintenance on machinery in heavy and constant use. It might also find application spotting development of fatigue in moving parts of automobiles, trains and aircraft.

Another expected use is on the production line for inspecting materials before final finishing. As a method for testing uniformity of structure it could find application inspecting metals that will be subjected to high temperature, pressure, wear fatigue or chemical attack.

Method — In its present state of development the analyzer requires test specimens with flat parallel faces(parallelism can sometimes be simulated by adding a metal wedge). Samples should be between ¼ and 5 in. thick and for best results between ½ and 2 in. Thicker or thinner samples give misleading results, although design refinements may change this limitation. The most practical frequency range runs from 5 to 100 megacycles.

The analyzer transmits and receives through a transducer. Findings are interpreted from attenuation of the ultrasonic signal, its characteristic velocity and shape of the reflected pulses as they show up on a cathode ray tube screen. Experiments are being made to establish measuring standards, and to determine more fully how internal changes, such as fatigue, affect the propagation characteristics of ultrasound.

A HALF CENTURY OF SERVICE

to the Iron and Steel Industry

Our half century of service to the metals industry has not been simply a matter of expanding productive capacity, nor producing more of the same.

To a large extent, it has been a matter of developing new uses for materials. It has been a problem of finding better products at lower cost . . . of looking continually for ways and means to help the steel and ironmaker meet the demands of his customers for better metals.

Consider our Research Center, for example. It's the most recent addition in our expansion program designed to broaden our service to the metals industry. This service provides our customers with valuable research information for solving alloy problems posed by today's complex and highly specialized needs.

Because a substantial increase in the use of ferro alloys is essential to meet these growing demands, we have expanded our alloy production facilities. We have modernized and stepped up our mining and milling operations. Existing plants have been modernized. New plants have been built. Today—after a half century of steady growth—we are one of the nation's largest producers of ferro alloys.

Through our product diversification . . . our fully integrated mining, milling and smelting operations . . . our research facilities, we have been able to meet and often anticipate the needs of the iron and steel industry.

We take pride therefore in this half century of service. And we are pointing our resources and the energies of our people to another half century of service.

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VANCORAM

Producers of alloys, metals and chemicals

Holders Cut Tool Grinds

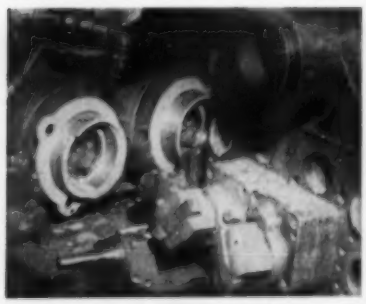
Switching to carbide insert holders reduced tool cost per piece from $0.019 to $0.0034

CHANGEOVER to carbide-insert-type holders at two stations on rough and finish operations of tractor, final-drive, pinion-bearing cages jumped production from 40 to 400 pieces a grind for a midwestern road machinery builder.

Work is done on a 25-hp, two-spindle Potter & Johnson automatic turret lathe in five operations, with two bearing cages machined per setup, using Wesson-metal carbide inserts and tips.

Operation—At station No. 1, carbide-tipped flat tools mounted on the turret rough bore two diameters and rough turn the body diameter on both cages.

At station No. 2, tipped flat tools mounted on the turret rough face the bottom of the bore and the flange of the cage mounted on spindle No. 2. Insert-type tooling mounted on the front cross slide rough faces the flange of the cage on spindle No. 1.

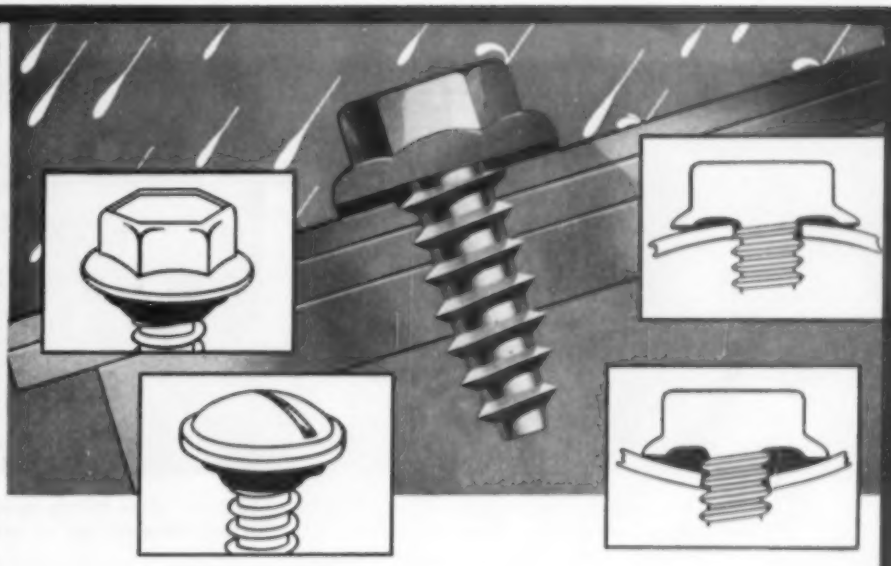


INSERT-TYPE HOLDERS
. . . jumped pieces per grind tenfold

Third Stage—Turret tools semifinish turn the cage diameters and semifinish bore one internal diameter on both cages at station No. 3 while the other and smaller internal diameter is finish bored.

At station No. 4, flat tools mounted on the turret finish face the bottom of the bore. The flange on cage No. 1 is finish faced with insert-type tooling while another insert tool mounted on the rear cross slide finish faces the flange on cage No. 2.

Outside diameters are finish turned on both cages and the larger internal diameter is finish bored at the final station.



New *Tuff-Tite Fastener Prevents Leaks—Protects Surface—Absorbs Shock—Stops Squeaks**

Tuff-Tite is a new multi-purpose fastener with a one-piece metal head and assembled neoprene washer that gives you quick, secure, economical, leakproof fastening of metals and plastics.

Use of Townsend's Tuff-Tite makes possible watertight fastening of galvanized steel, protected metal, stainless steel, aluminum, plastic and other roofing and siding materials at substantial savings over conventional fasteners.

Leaks between the head of the screw and the metal washer are impossible because they are made as one piece. When this fastener is tightened, the pre-assembled neoprene washer is trapped and controlled by an undercut in the washer head. The neoprene is forced into the hole and around the threads to form a watertight and airtight seal.

Tuff-Tite fasteners provide surface protection in assembly of appliances and similar products. The neoprene washer provides a cushion that permits tight seating without cracking or chipping porcelain enamel and other fine finishes.

Where vibration noise is a problem in automobiles, railroad passenger cars and machinery, the cast neoprene washer on Tuff-Tite fasteners acts as a shock absorber—eliminates squeaks and chatter.

Tuff-Tite fasteners are available as self-tapping screws, thread cutting screws, drive screws, machine screws, stove bolts, wood screws, nails and special products. They are made of carbon, alloy and stainless steel, aluminum, copper and other metals in a variety of head styles.

To learn more about how Tuff-Tite can increase your fastening efficiency—improve your products, use the coupon below or write.

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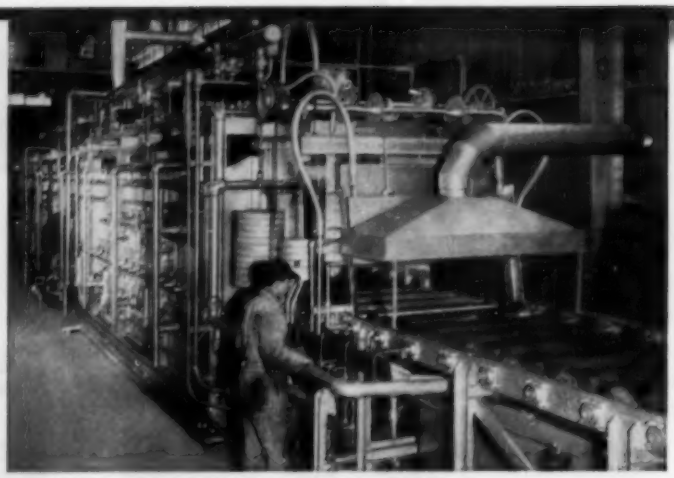
continuous processing



'Surface' roller hearth furnace for continuous carbon restoration-annealing of bars and coils.

'Surface' atmosphere equipment

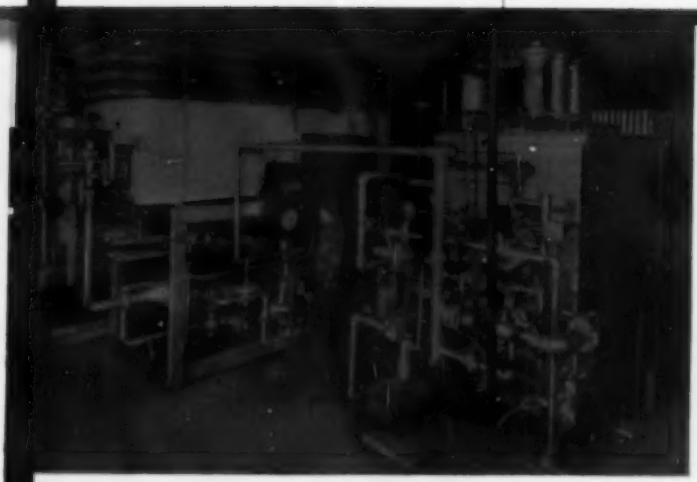
'Surface' lift cover car bottom furnace used for batch carbon restoration-annealing of bar stock.

batch processing

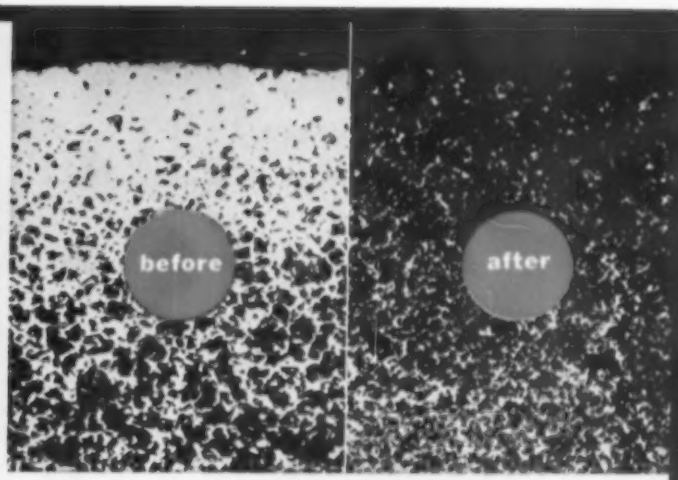
Here are a couple of graphic reminders that Surface Combustion atmosphere equipment helps meet today's demands for top quality steel.

These cases repeat a familiar story in the steel industry: a steel processor wants to improve the metallurgical qualities of his stock—'Surface' equipment meets, and frequently exceeds, his specifications.

In your current program for improving the marketability of your products, look to 'Surface' to provide the right atmosphere for easier sales.



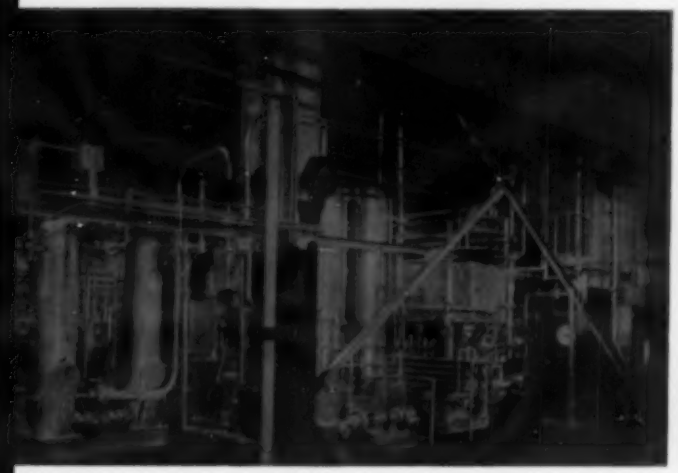
'Surface' atmosphere generators for this installation. RX unit in the foreground, NX unit in the background.



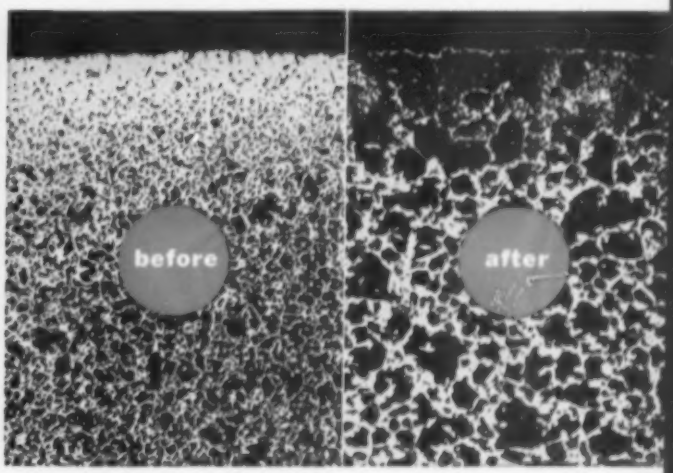
Before and after photomicrographs, Carbon steel AISI C1050. The results: carbon restored to the decarburized skin; steel which reduces the customer's machining costs, eliminates rejects.

makes steel easier to sell

'Surface' atmosphere generators next to the furnace. NX generators and coolers in the foreground, RX generator and dew point recorder in the background.



Before and after photomicrographs, C-1045, 1 1/16" round, coarse grain, 75x, 4% Nital etch. The results: carbon restored to the decarburized skin; steel that sells and opens new markets for the processor.



Surface
STEEL MILL FURNACES

SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO

OUR CHALLENGE

Anything you can make of steel sheets . . .

— you can make of . . .

WHEELING
SOFTITE®
GALVANIZED SHEETS

. . . with the tightest zinc coating yet produced!

Here is a galvanized sheet with a tighter bond — tighter than any sheet yet produced. Manufactured by a new continuous galvanizing process, Wheeling SOFTITE is vastly more ductile, more workable.

Wheeling SOFTITE enables you to perform the most difficult operations without the coating chipping, cracking, peeling or flaking!

This sprinkling can head, for instance, had to be electro-plated after fabrication. Now, using Wheeling SOFTITE, electro-plating is eliminated. SOFTITE'S zinc coating remains smooth and unbroken even after these severe drawing operations.

If *you've* been having difficulty using customary galvanized sheets, try Wheeling SOFTITE. So many users have called it the best galvanized sheet yet produced that Wheeling is tripling its production facilities in 1955. Wheeling Steel Corporation, Wheeling, West Virginia.

IT'S WHEELING STEEL

WHEELING STEEL

DISTRICT SALES OFFICES — Atlanta Boston Buffalo Chicago Cincinnati Cleveland Detroit Houston New York Philadelphia St. Louis San Francisco Wheeling

NEW PRODUCTS and equipment

Write directly to the company for more information

Straightening Press

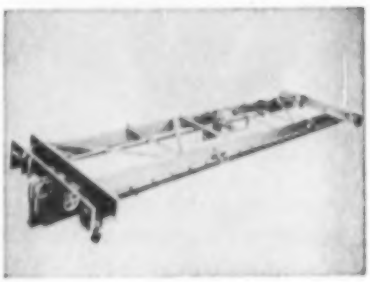
This press (400-ton capacity, with 24-in. stroke) is equipped with a two-way traveling head. It is used to straighten large weldments and castings.

Components include a large, one-piece bed weldment with removable bolster plate; a welded steel bridge for supporting the traveling cylinders and power unit; two, welded steel side housings containing four columns and steel rollers; a welded steel yoke that passes under the bed and receives one end of each of the four columns. Columns are prestressed to hold the traveling unit rigid. The weight of the traveling unit is supported on four steel rollers that travel on tracks, one on each side of the press bed. A hand lever controls the ram travel. American Steel Foundries, Elmes Engineering Div., 1150 Tennessee Ave., Cincinnati 29, O. Redwood 9210

Fluid Drive Cranes

They are available in 1 to 5-ton capacities, with spans of 16 to 40 ft in each capacity range. All motors are totally enclosed, and high-torque, ball-bearing equipped for alternating or direct-current use. Weatherproof and dust tight, they are rated to operate under full loads without overheating. The double-reduction, helical gear reducer is equipped with Timken, tapered, roller bearings on all shafts. Pinions are induction hardened and lapped with gears for maximum smoothness and quiet operation. Reducer efficiency is 96 to 98 per cent. Braking is accomplished by an electric-solenoid, shoe-type, spring-actuated brake which closes when the flow of current is interrupted.

End trucks are steel, rigidly braced, with welded construction throughout. Philadelphia Tramrail Co., 3420 N. Weikel St., Philadelphia 34, Pa. Jefferson 3-5100



12,000-Lb Capacity Lift Truck

With addition of this unit, trucks are available in these capacities: 1000, 2000, 3000, 4000, 6000, 8000, 10,000, 12,000, 15,000, 16,000 and 18,000 lb. The new model, RT-120, has a net weight of 14,600 lb. It incorporates the overhead tilting mechanism. Standard lift height is 17 ft 6 in. Optional heights, ranging from 8 ft 2 in. to 24 ft, are available.

Outside turning radius is 180 in. Over-all width and wheelbase length both measure 86 in. The truck's maximum speed is about 19 mph in forward or reverse. A six-cylinder, International Harvester engine powers the unit. Heavy-duty, 7:50 x 15, 10-ply tires are used. Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg. Tuxedo 5011

NEW PRODUCTS and equipment

Improved Industrial Filter

The model 10 automatically rotates a fresh filtering area into position while simultaneously ejecting the contaminated cake. The filtering screen is divided into eight, screw-mounted parts. Filter screen material and the size of the screen opening can be supplied in Monel, stainless steel, brass or bronze. Contaminant retained on the filter screen is removed by air pressure and is dropped directly into the exit chute. The filter float control actuates the air unit when the drum turns. Elimination of tuning rods permits the enlargement of the filtering area about 15 per cent without enlarging the necessary floor area.

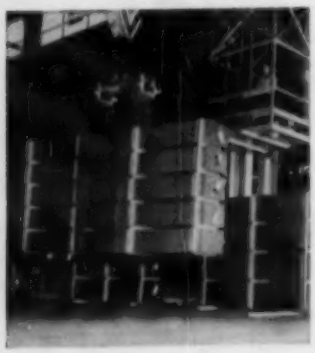
The filter may be used on an individual machine unit, or as a central filter for many units. The gallon capacity of filtration may be increased by adding filter drums in tandem, separately or in the same tank. Murray-Way Corp., Birmingham, Mich. Jordan 4-6890

Wide-Type Mechani-Seal Ball Bearings

The W-KLL series is made in standard bores and outside diameters. Widths are the same as those of corresponding size double-row bearings. Seven sizes are designed for applications where frictionless sealing and large grease capacity are important.

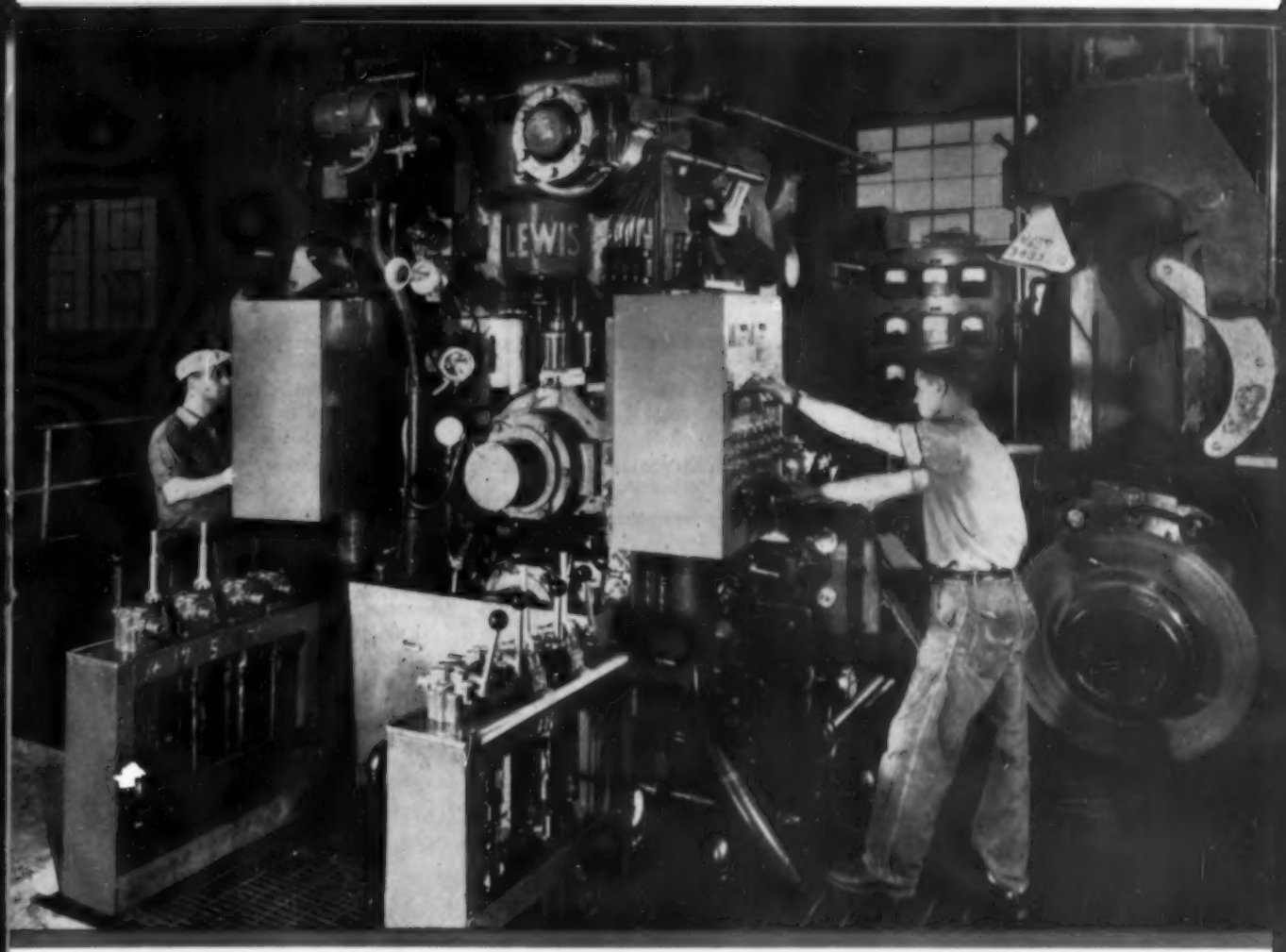
Bearings are made of two, dished-steel plates. The inner member is fixed securely in the outer ring of the bearing and provides effective grease retention. The corrosion-resistant outer member is pressed on the outside diameter of the inner ring and rotates as a slinger to throw off contaminants. The wide width provides extra support on shafts and housings. Prelubrication with long-life, factory-filtered grease is also standard. Fafnir Bearing Co., New Britain, Conn. Baldwin 9-0381

Welded Aluminum Pipe



Irrigation pipe and furniture tube are being fabricated from aluminum strip at Aluminum Co. of America's Alcoa, Tenn., works. The mechanical properties of the welded tube are about the same as those of drawn and extruded shapes where the same alloys are used.

The irrigation pipe (also sold as construction pipe) has a thin layer of special aluminum alloy on its inner and outer surfaces for protection in corrosive applications. It is available in 3, 4 and 6-in. diameters and in 20, 30 and 40-ft lengths. The furniture tube has a 1-in. OD and 0.049-in. wall thickness and comes in lengths from 3 to 20 ft. Minimum tensile strength is 28,000 psi, with a 25,000 psi minimum yield strength. Minimum recommended centerline bend radius is 3 in. Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa. Atlantic 1-4545



. . . new mill performs multiple operations on large variety of re-roll items

With this new Lewis Combination 2-high/4-high Reversing Mill you can economically handle a large variety of re-roll items in small tonnage quantity.

Designed and built by Lewis, the mill can cold reduce steel strip, skin pass, temper roll and gauge correct . . . either light or heavy gauge material . . . at speeds from 600 to 1800 fpm.

When operated as a 4-high mill, using 4½ and 16 x 20 rolls, it has driven back up rolls . . . each roll having its own individual motor without mechanical tie-in. When operated as a 2-high mill, using 21 x 18 rolls, the same motors and drive are used.

First of its kind ever built, this new Lewis Mill makes an ideal investment for any plant that requires a versatile mill to profitably handle a variety of re-roll products.

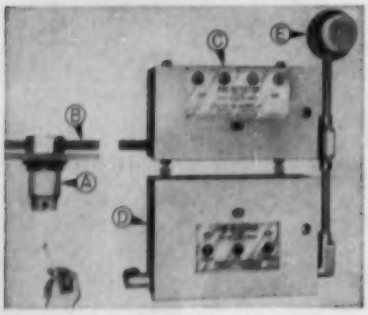
Whether you may need a mill of this type or some other kind, our experienced engineers and modern manufacturing facilities are always available to design and build sturdy mill equipment to meet your specific requirements.

LEWIS COMBINATION 2 HIGH / 4 HIGH REVERSING MILL

BLAW-KNOX

BLAW-KNOX COMPANY • LEWIS MACHINERY DIVISION
PITTSBURGH 22, PENNSYLVANIA

LEWIS PRODUCTS: Two-High Mills • Three-High Mills • Four-High Mills • Strip Mills • Bar, Billet and Structural Mills • Plate Mills • Rod Mills • Coilers • Tables • Shears • Pinion Stands • Gear Drives • Roll Lathes



Radioactive, Automatic Fire Alarm System

Heart of the system is an overhead detection device which is electrically connected to a fire indicating cabinet. Principal parts of the detection component are shown in the bottom photo. They are: (A) The socket base. (B) The plug-in detector assembly. (C) The locking shell.

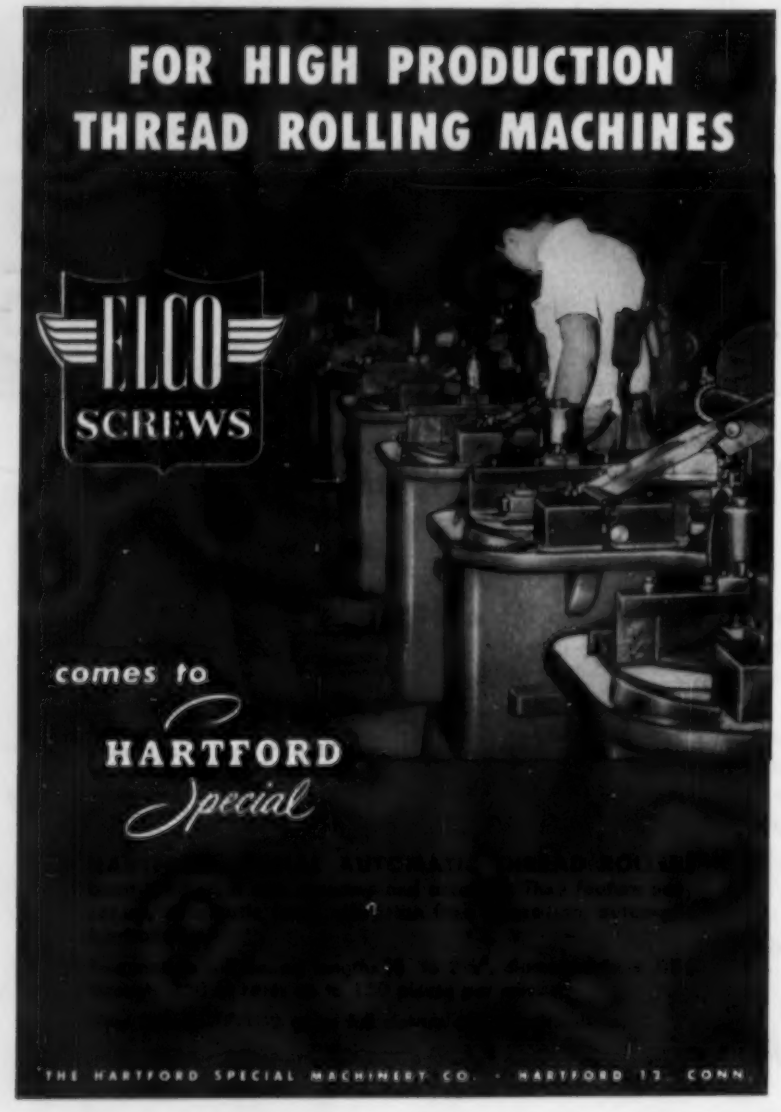
Each head contains a sensitive, gas-discharge (cold cathode) tube, plus two independent chambers, one of which is exposed to the atmosphere, the other sealed from it. A minute source of radioactive material is mounted in each chamber. Radiation ionizes air in chambers, causing them to become electrically conductive.

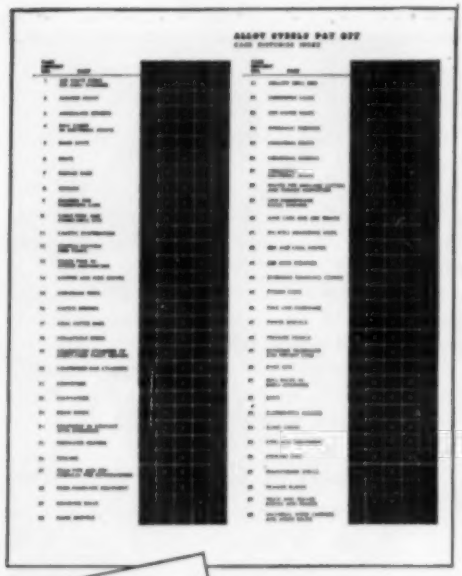
Each chamber is adjusted to give equal voltage where combustion gases or smoke are nonexistent. When combustion gases or smoke are present, the balanced condition no longer exists. The exposed chamber changes the condition, causing the tube to become electrically conductive. This, in turn, operates a relay in the space-indicating or fire-indicating cabinet. The relays function to give

visual and audible alarms, close fire doors, activate fire extinguishing systems, warn public fire departments or perform other fire protection functions.

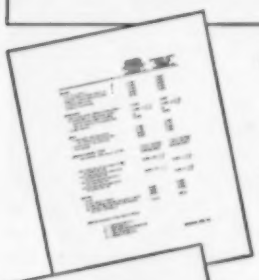
The pre-detector head can be attached to a standard, 4-in., round, electrical conduit box and adjusted to its own sensitivity. As many heads as are necessary can be connected in a two-wire circuit to the fire indicating cabinet.

The photo on the left shows the system being activated by cigaret smoke. The units are: (A) The pre-detector head. (C) The space-indicating cabinet. (D) The fire-indicating cabinet. An electrical conduit (B) and the alarm bell (E) complete the assembly. A space-indicating cabinet, if used, will show the location of the disturbance. C-O-Two Fire Equipment Co., Newark, N. J. Bigelow 8-2200



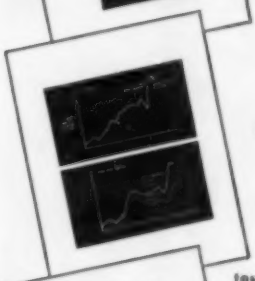


60 fully documented case histories

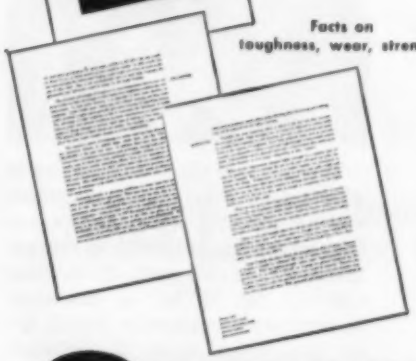


Facts on maximum pay load

Facts on lower operating costs



Facts on lower corrosion rate



Facts on toughness, wear, strength

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This fact-packed handbook is a must for you if you use steel. Here, in completely documented form, you'll find how the use of alloy steels adds economies, increases service life, offers many other advantages.* Cost-conscious executives will find the full story on these economies of alloy steel in the first section of the handbook. Designers and metallurgists will find the advantages of alloy steels in the 60 case histories. Get your copy today. Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

M55-18

***Advantages of ALLOY STEELS**

- longer life
- greater pay load
- lower operating costs
- greater safety
- less maintenance

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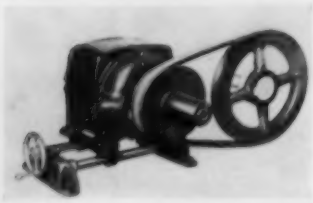
NEW PRODUCTS and equipment

Variable Speed Pulley Provides Finger-Tip Control



Offering ratios up to 3:1 at from 7½ to 15 hp, it can be installed on new or old equipment. Finger-tip pressure changes speed while machinery is in motion. This feature permits quick changes to compensate for operator ability, corrections for size or density of parts or stock and adjustments for temperature or humidity.

Used with a 1750-rpm motor, maximum horsepower is 10 with the No. 310 base, 15 with the No. 315 base. A 1150-rpm motor affords 7½-hp with the No. 310 base and 10 hp with the No. 315. It uses a Lovejoy No. 27, 2¾-in.- top-width, variable-speed belt. Standard bores are 1¼, 1⅜ and 1⅝-in. Lovejoy Flexible Coupling Co., 4871 W. Lake St., Chicago 44, Ill. Estebrook 9-3010

AJAX

THE WORLD'S FINEST SELF-ALIGNING COUPLING

DIHEDRAL

When you realize that all the horsepower goes through the coupling, you will realize that the most expensive coupling is the *least expensive.*

AJAX Dihedral Couplings handle angular, offset and end float misalignment heretofore considered impossible.

The secret of the performance of AJAX Dihedral Couplings begins with AJAX dihedral tooth design. It permits holding tooth clearance to lubrication film requirements. Load is distributed at center of teeth, the point of greatest strength. All teeth are case hardened to combine hard wear surface with tough core.

AJAX Advantages Affect Every Department of Your Business.

AJAX Dihedral Couplings give new economies in design, manufacturing and assembly. Be sure to look into the advantages of this vital connecting link between driving and driven machines.

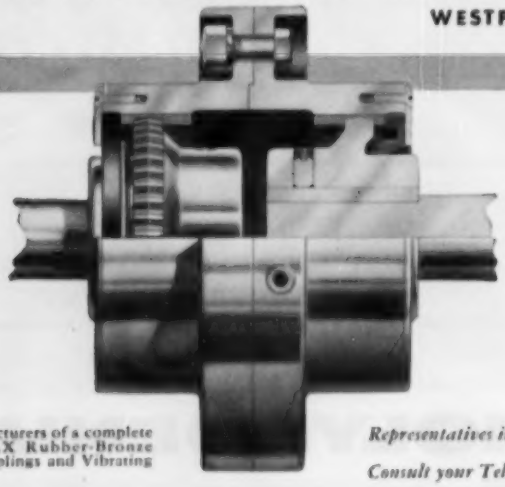
Hundreds Proven in 5 Years On-the-Job Field Tests.

AJAX Dihedral Couplings have been through every test of time and service on rolling mills, paper mills, dredges, earth moving machinery and other heavy duty installations.

Phone the AJAX representative or write the AJAX factory for case histories, and you will spark-plug some worthwhile thinking.

AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.



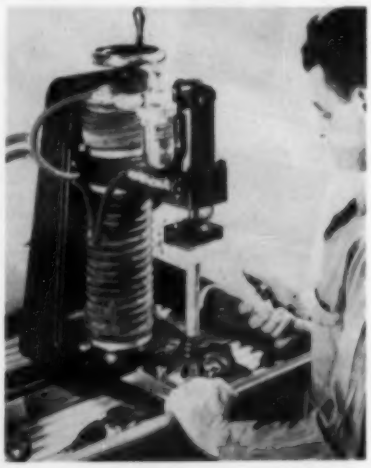
Also manufacturers of a complete line of AJAX Rubber-Bronze Bushed Couplings and Vibrating Conveyors.

Representatives in Principal Cities

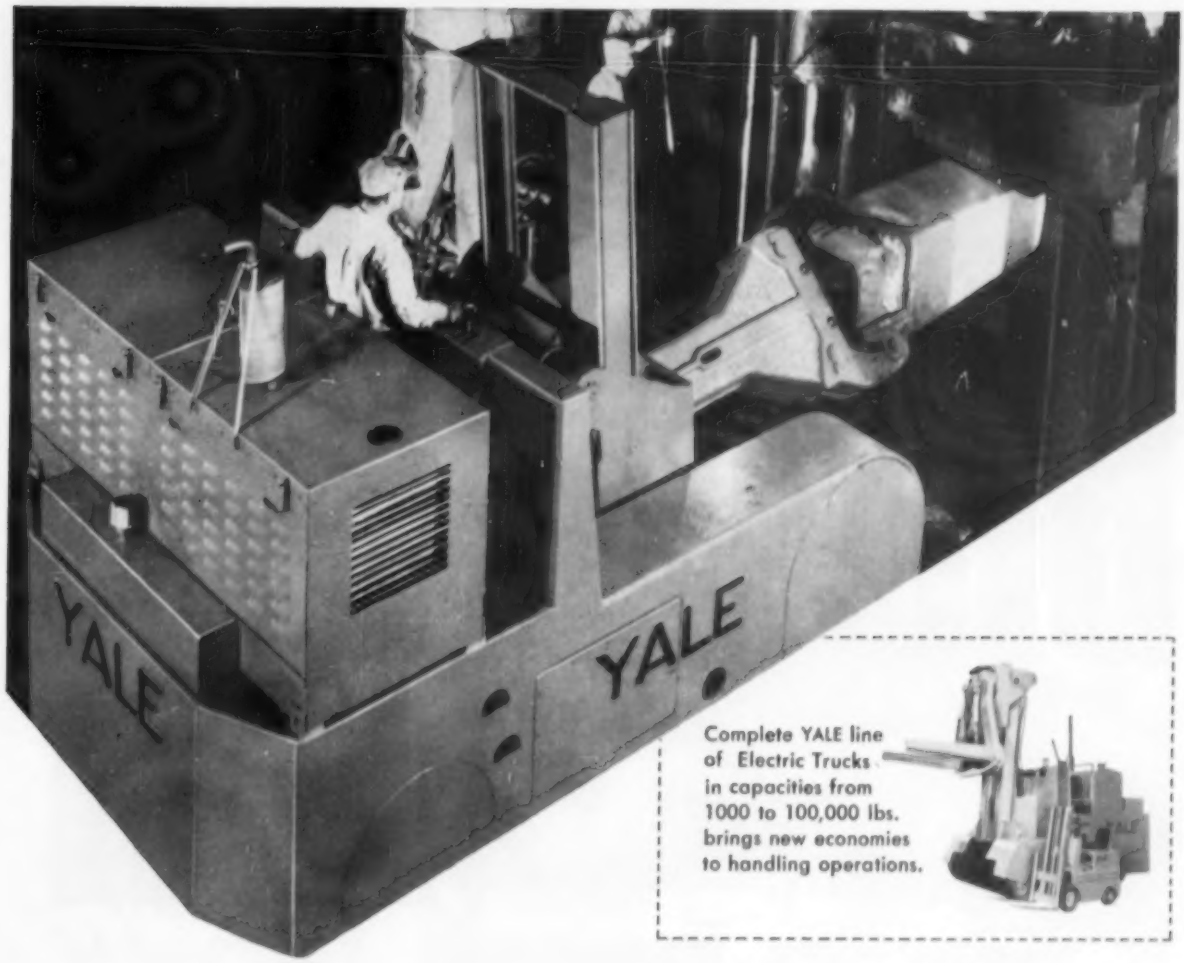
Consult your Telephone Directory

Vertical Contact Adapter

The X-1584 is really a special jig. It fits any standard horizontal Magnaflux unit. Almost no installation is required. Once installed, it can be connected or disconnected in 2 to 5 minutes. The vertical contact adapter thus substantially reduces inspection man-hours and costs on smaller parts without limiting the versatility of the basic unit. The X-1584 comes with quick disconnect air hoses for the necessary pneumatic connectors. Cables and attachments for magnetizing currents are also provided.



The adapter clamps on the rails with a lock shoe. It draws power and air directly from the Magnaflux unit. The adjustable contact heads will handle parts 12 in. long and up to 10 in. in diameter. A removable conductor which fits on the upper head is included. Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill., Underhill 7-8000



Complete YALE line of Electric Trucks in capacities from 1000 to 100,000 lbs. brings new economies to handling operations.

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This powerful YALE Industrial Truck is equipped with a special ingot-revolving attachment for faster forging of multi-ton ingots. Both truck and attachment are typical of YALE versatility in solving any sort of handling problem for the metals industry. On the production line, in receiving, shipping and storage, YALE Gas, Electric and Diesel Trucks work harder, last longer, handle smoother. They are engineered to resist shock loads better—thus reducing operator fatigue, extending truck life and increasing handling savings. For detailed information, send coupon today.

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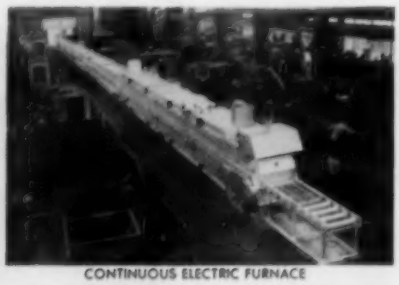
Street_____ City_____ State_____
In Canada write: The Yale & Towne Manufacturing Co.
St. Catharines, Ontario, Canada

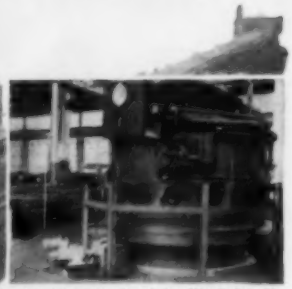
AUTOMATIC ROLLER GRID FURNACE



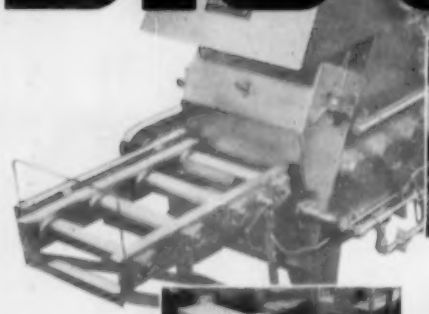
CONTINUOUS ELECTRIC FURNACE

GAS-FIRED ATMOSPHERE TYPE FURNACE

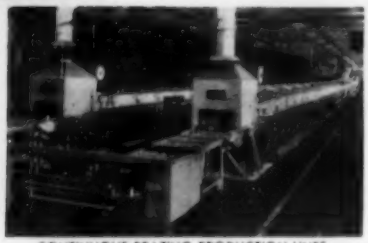
BIG ONES



AUTOMATIC ROTARY HEARTH FURNACE



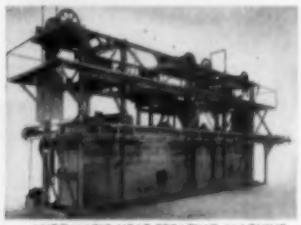
ALUMINUM BILLET HEATER



CONTINUOUS BRAZING PRODUCTION LINES

CONTINUOUS ROTARY RETORT FURNACE

CONTINUOUS CONVEYOR FURNACE



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CONTINUOUS VITREOUS ENAMELING LINE

. . . all field-erected by Lindberg

Maybe you haven't heard the news. Lindberg is now set up to field-erect any type of industrial heating or processing installation. Here are just a few of the large field-erected installations already put up by Lindberg. More are being built right now.

You get a complete package deal from Lindberg. Expert engineers consult with you and analyze your needs. Then they plan and design an installation to meet your specific requirements, whether you need a single furnace or a complete production line. And Lindberg will build it for you, right in your own plant.

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NEW PRODUCTS and equipment

Aluminum Hand Forging

Tighter specification values and improved soundness standards are offered for hand forgings in 7075-T6 and 2014-T6. They are heat-treatable aluminum alloys which have been solution heat treated and artificially aged.

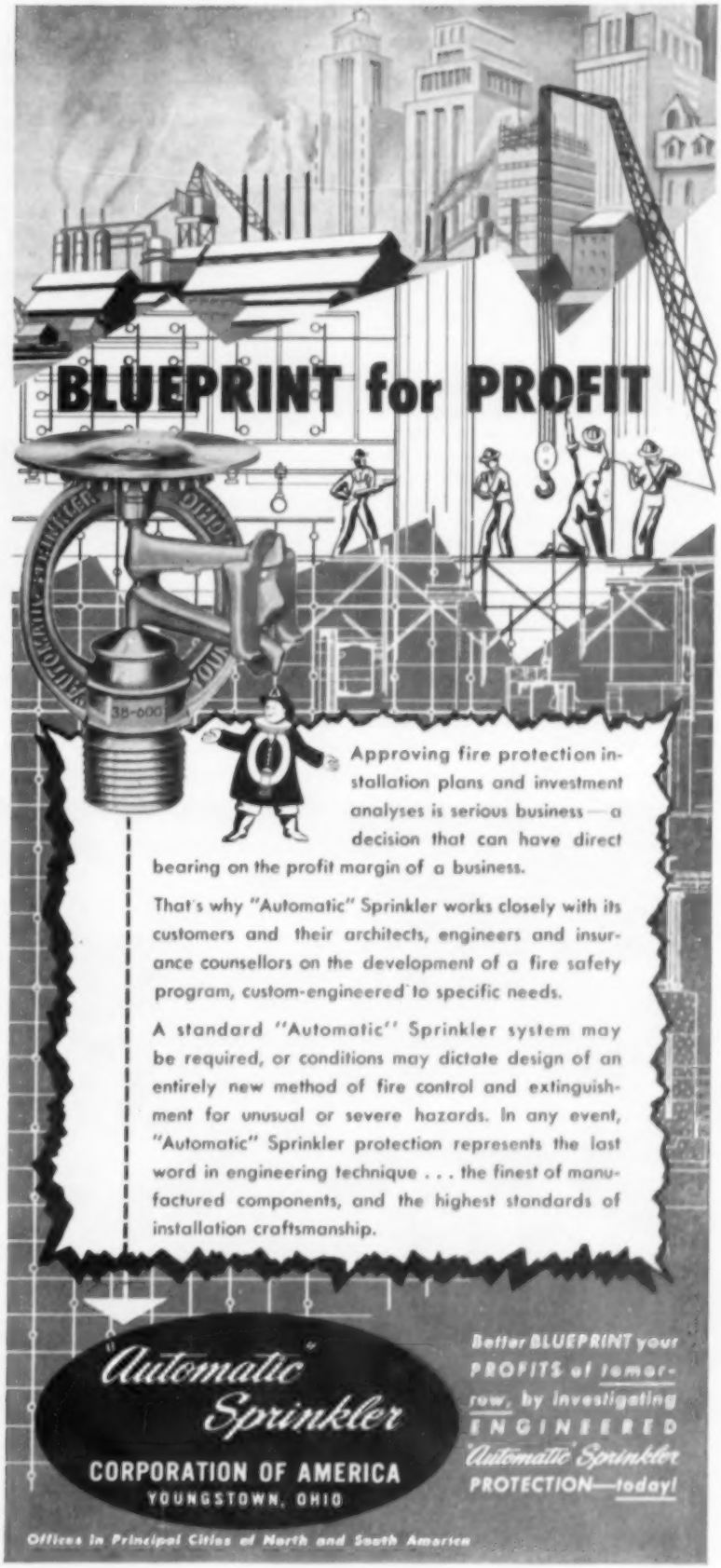
Both standard and special-purpose forging guarantees are upped,

with the latter the higher of the two. Elongation values and fatigue characteristics of both are improved. Hand forgings will not contain defects in excess of No. 3 AUSR block standards (previous guarantee was No. 5). Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif. Twinoaks 3-4600

Fine Pitch Hobs

Redesigned to meet revised ASA standards, these hobs are for cutting gears with a diametral pitch of 20 to 120. They are available in three bore diameters — 0.315, 0.750 and 1.250 in.—for cutting gears with a pressure angle of 14½

or 20 degrees. They range in size from ¾-in. in diameter x ½-in. to 2½-in. in diameter x 2½-in. Illinois Tool Works, 2501 N. Keeler, Chicago, 39, Ill. Capitol 7-2200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NEW Literature

Write directly to the company for a copy

Motor Buying

Information on standard, alternating-current, fractional and intergral horsepower motors includes photos, ratings, book prices, dimensions, weights, frame numbers and standard modifications—GEC-1026, 28 pages. General Electric Co., Schenectady 5, N. Y.

Flamatic Hardening Machines

Flamatic selective heating is a basic, proved method of hardening, brazing and heat processing. The machines and allied equipment are discussed in detail—publication M-1861, 21 pages. Cincinnati Milling Machine Co., Process Machinery Div., Cincinnati 9, O.

Threading Heads

Detailed data on Landis' heat-treated heads, standard and special, are offered. All die heads are illustrated and complete specifications are given—bulletin F-90-3. Landis Machine Co., Waynesboro, Pa.

Pressure Tubing

Flexible nylon tubing (Nylaflow) is used in air, process, coolant, fuel and oil, lubricant and hydraulic lines. Information covers advantages and properties—6 pages. Polymer Corp. of Pennsylvania, Reading, Pa.

Lathe

A folder describes in detail the Delta, 11-in., metal-cutting lathe and a complete line of engineered accessories. Cutaway photos and line drawings explain design features—8 pages. Delta Power Tool Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

Bending Blocks

They are used for bending, layout work, assembling, etc. Information includes the description of a typical, four-block installation and a partial list of users—4 pages. Acorn Iron & Supply Co., Delaware Ave. at Poplar St., Philadelphia 23, Pa.

Fire Extinguisher Care

"Safety Code for Inspecting, Recharging and Maintaining Portable Fire Extinguishers" is industry-prepared and approved—50 cents. Fire Equipment Manufacturers' Association Inc., 813 Clark Bldg., Pittsburgh 22, Pa.

Insert Bits, Holders

They are designed to drive Phillips screws. This catalog explains how they insure absolute accuracy between the bit and recessed head of the screw—14 pages. Continental Screw Co., New Bedford, Mass.

Records

"Break Through Your Cost Barrier" describes the Univac 120. This machine produces complete and useful records, speeds the preparation of reports, saves the time of skilled personnel and eliminates many machine operations—TM-932. Remington Rand Inc., 315 Fourth Ave., New York 10, N. Y.

Wirebound Crates

They are being used to ship machine tools and other heavy products. This booklet shows why engineered wirebound containers are effective and economical—6 pages. General Box Co., 1825 Miner St., Des Plaines, Ill.

Aluminum Sections

Standard shapes available from existing tooling at Harvey Aluminum are described and illustrated. This reference catalog will be of interest to manufacturers, fabricators and engineers who utilize standard alumi-

The CHIP-TOTE conveyor permits complete utilization of machine tools by eliminating shut-down for manual scrap removal.

It handles a continuous flow of hot, wet or dry chips, turnings and borings from any multiple spindle automatic machine.

NEW LITERATURE

num sections—60 pages. Harvey Aluminum, 19200 S. Western Ave., Torrance, Calif.

Stud Welding

"Stud Welding Specifications" gives ordering and engineering data on the 12 most commonly used studs. Applications and equipment are reviewed—16 pages. KSM Products Inc., Stud Welding Div., Merchantville 8, N. J.

Electronic Grinding

Here's how electronic control makes possible automatic electrolytic grinding of cemented carbide tools and other hard-to-work materials—12 pages. Anocut Engineering Co., 631 W. Washington St., Chicago 6, Ill.

Automatic Nut Formers

These multiple-die, single-stroke transfer headers are equipped to produce automatically a cold-forged, finished nut blank with every stroke of the heading ram or gate. Operation is explained. Specifications for five sizes are included—circular No. 930-A-2, 8 pages. Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Ramming Mixes

"Suggested Methods of Installing Permanente 165 and 84 Ramming Mixes" gives detailed instructions for building forms, mixing basic refractory materials and ramming them—38 pages. Kaiser Aluminum & Chemical Sales Inc., Kaiser Chemicals Div., 1924 Broadway, Oakland 12, Calif.

Electric Lift Truck

The Power Ox with a standard, 6-in. lift is described. Bulletin contains full specifications and detailed illustrations of the distinctive features of the truck—551-1, 4 pages. Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.

Diecasting Machine

The model 200 (for zinc, tin or lead) is described. Outstanding features are briefly covered. Specifications are included—4 pages. Cleveland Automatic Machine Co., Cincinnati 12, O.

Power Transmission

The Poly-V-Drive is detailed. Engineering data, drive tables, sheave and belt specifications are included—catalog PV-200, 36 pages. Browning Mfg. Co., Maysville, Ky.

NEW BOOKS

Electroplating Engineering Handbook, A. Kenneth Graham, Reinhold Publishing Corp., Book Div., 430 Park Ave., New York 22, N. Y., 1955. 650 pages, $10.

Information on processing techniques and engineering factors involved in constructing plating equipment. Standards, specifications and testing of deposits are covered.

Protective Coatings for Metals, second edition, R. M. Burns and W. W. Bradley, Reinhold Publishing Corp., Book Div., 430 Park Ave., New York 22, N. Y., 1955. 640 pages, $12.

Gives information on composition, properties and performance of metallic and organic coatings. Includes latest practices in metal cleaning, coating application and testing.

Titanium in Iron & Steel, George F. Comstock, John Wiley & Sons Inc., 440 Fourth Ave., New York 16, N. Y., 1955. 294 pages, $6.

Reviews effects of titanium as an addition to cast iron and steel. Deoxidizing effects are discussed in full.

Now is the time to put AUTOMATION to work . . . Now is the time to cut production costs . . . May-Fran engineers design and build complete scrap handling systems for the automatic removal of machine turnings or chips. May-Fran conveyors will transmit scrap to ultimate point of disposal.

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Bulletin MF-530 describes the new Hinged-Steel conveyor belt.

Bulletin MF-640 describes the Chip-Tote conveyor which removes scrap from operating machines.

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Market Outlook

WE can have high steel production in this country without a shooting war.

That is being demonstrated now. Steel ingot output in the week ended Apr. 17 was 95.5 per cent of capacity. Another half point would give a yield equal to the record of 2,324,000 net tons set in the week ended Mar. 29, 1953—during the Korean war.

HIGHEST SINCE 1953—To turn out 2,324,000 tons a week in 1953, the steel industry had to operate at 103 per cent of capacity. Capacity has continued to increase, and now the same tonnage can be produced at a 96-per-cent rate. At 95.5 per cent of capacity in the week ended Apr. 17, the industry poured 2,304,680 net tons of steel—highest since the record 2,324,000 tons in 1953.

CLIMBS AGAIN—In registering 95.5 per cent in the week ended Apr. 17, the rate rose half a point over the level that prevailed in the preceding two weeks—they marked the first period this year that the ingot rate did not rise each week.

Although we're not in a shooting war, all the steel is not going to civilian uses. About 10 per cent is winding up in hard goods for defense purposes.

GOOD REASONS—Gain in civilian business, however, is the cause for the high steel production. Among reasons for it are: Expanding population, high output of automobiles, high rate of construction, need to increase steel inventories into line with higher consumption rates and some stockpiling in anticipation of a steel price rise.

INFLUENCES PRODUCT MIX—Biggest single consumer is the automotive industry. It is taking approximately 26 per cent of the mill shipments of finished steel. Because the auto industry is buying a big chunk of the steel output, the nature of its needs is causing the proportion of the light, flat-rolled products to be high. Forty per cent of finished steel shipments are in that category. Some mills are setting new records for production of sheets—leader of the light, flat-rolled products.

ADDED PRESSURE—Seasonal pickup in the construction industry—second largest user of steel—is tightening the supply of the forms of steel it uses. Producers of wide-flange beams are virtually sold out for this quarter. That product tightens early because of the relatively small capacity for making it—there are only four producers. A fifth will be Inland Steel Co. Its leading project in a vast construction program at its Indiana Harbor, Ind., Works is for wide-flange beams.

BETTER THAN EXPECTED—The momentum of the construction industry is tightening supplies of plates, too. Westinghouse Electric Corp., Pittsburgh, says purchases of plates for turbines, turbogenerators and other heavy electrical equipment that go along with construction in the electrical industry is about 30 per cent over estimates the company made last November. Westinghouse, using twice the amount of steel it did last summer, explains: "We aren't stocking against a possible steel strike. We actually need the steel because our sales are much better than we anticipated."

NATIONAL STEELWORKS OPERATIONS

DISTRICT INGOT RATES

(Percentage of capacity engaged)

	Week Ended Apr. 17	Change	Same Week 1954	Same Week 1953
Pittsburgh	97	+ 0.5*	71.5	98.5
Chicago	98.5	0*	76.5	105
Mid-Atlantic	95	0	59	96.5
Youngstown	96	0	68	95
Wheeling	91.5	— 1	73	100.5
Cleveland	97	— 5.5*	66.5	105.5
Buffalo	104.5	0	67.5	108.5
Birmingham	90	+ 2.5	46	101
New England	82	0	60	87
Cincinnati	90.5	— 1	56.5	94
St. Louis	90	— 5	62.5	75.5
Detroit	88	— 4	59	106
Western	98	+ 1	80	110.5
National Rate	95.5	+ 0.5	67	97

INGOT PRODUCTION‡

	Week Ended Apr. 17	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	142.7†	143.2	141.5	101.0
NET TONS (In thousands)	2,292†	2,300	2,273	1,622

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,413,278 in 1955; 2,384,549 in 1954; 2,254,459 in 1953.

Metalworking Outlook—p. 47 Technical Outlook—p. 103

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Apr. 13 1955	Apr. 5 1955	Month Ago	Mar. Average
(1947-1949=100)	144.7	144.7	144.7	144.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 12

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.525	Sheets, Electrical	$9.350
Rails, Light, 40 lb	5.917	Strip, C.R., Carbon	7.493
Tie Plates	5.275	Strip, C.R., Stainless, 430 (lb)	0.415
Axles, Railway	7.500	Strip, H.R., Carbon	5.113
Wheels, Freight Car, 33 in. (per wheel)	48.500	Pipe, Black, Buttweld (100 ft)	15.000
Plates, Carbon	4.675	Pipe, Galv., Buttweld (100 ft)	18.605
Structural Shapes	4.517	Pipe, Line (100 ft)	146.804
Bars, Tool Steel, Carbon (lb)	0.430	Casing, Oil Well, Carbon (100 ft)	154.216
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.525	Casing, Oil Well, Alloy (100 ft)	227.875
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.115	Tubes, Boiler (100 ft)	‡
Bars, Tool Steel, H.R., Alloy, High Speed W 18, Cr 4, V 1 (lb)	1.610	Tubing, Mechanical, Carbon	‡
Bars, H.R., Alloy	6.875	Tubing, Mechanical, Stainless, 304 (100 ft)	161.193
Bars, H.R., Stainless, 302 (lb)	0.423	Tin Plate, Hot-dipped, 1.25 lb	8.533
Bars, H.R., Carbon	5.000	Tin Plate, Electrolytic, 0.25 lb	7.233
Bars, Reinforcing	4.963	Black Plate, Cannmaking Quality	6.333
Bars, C.F., Carbon	6.160	Wire, Drawn, Carbon	7.938
Bars, C.F., Alloy	11.375	Wire, Drawn, Stainless, 430 (lb)	0.545
Bars, C.F., Stainless, 302 (lb)	0.438	Bale Ties (bundle)	5.860
Sheets, H.R., Carbon	4.870	Nails, Wire, 8d Common	7.815
Sheets, C.R., Carbon	5.864	Wire, Barbed (80-rod spool)	7.127
Sheets, Galvanized	7.220	Woven Wire Fence (20-rod roll)	16.925
Sheets, C.R., Stainless, 302 (lb)	0.553		

‡Not available.

STEEL's FINISHED STEEL PRICE INDEX*

	Apr. 13 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 avg.=100)	194.53	194.53	194.53	189.74	156.13
Index in cents per lb	5.270	5.270	5.270	5.140	4.230

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$118.45	$118.45	$118.45	$113.70	$93.18
No. 2 Fdry, Pig Iron, GT	56.54	56.54	56.54	56.54	46.47
Basic Pig Iron, GT	56.04	56.04	56.04	56.04	45.97
Malleable Pig Iron, GT	57.27	57.27	57.27	57.27	47.27
Steelmaking Scrap, GT	37.41	37.41	37.50	25.33	29.08

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 84; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Apr. 13 1955	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.30	4.30	4.30	4.15	3.45
Bars, H.R., Chicago	4.30	4.30	4.30	4.15	3.45
Bars, H.R., deld. Philadelphia	4.55	4.55	4.55	4.405	3.93
Bars, C.F., Pittsburgh	5.40	5.40	5.40	5.20	4.10-4.15
Shapes, Std., Pittsburgh	4.25	4.25	4.25	4.10	3.40
Shapes, Std., Chicago	4.25	4.25	4.25	4.10	3.40
Shapes, deld. Philadelphia	4.53	4.53	4.53	4.38	3.42
Plates, Pittsburgh	4.225	4.225	4.225	4.10	3.50
Plates, Chicago	4.225	4.225	4.225	4.10	3.50
Plates, Coatesville, Pa.	4.225	4.225	4.225	4.10	3.60
Plates, Sparrows Point, Md.	4.225	4.225	4.225	4.10	3.50
Plates, Claymont, Del.	4.225	4.225	4.225	4.10	3.60
Sheets, H.R., Pittsburgh	4.05	4.05	4.05	3.925	3.35
Sheets, H.R., Chicago	4.05	4.05	4.05	3.925	3.35
Sheets, C.R., Pittsburgh	4.95	4.95	4.95	4.775	4.10
Sheets, C.R., Chicago	4.95	4.95	4.95	4.775	4.10
Sheets, C.R., Detroit	5.10	5.10	5.10	4.975	4.30
Sheets, Galv., Pittsburgh	5.45	5.45	5.45	5.275	4.40
Strip, H.R., Pittsburgh	4.05	4.05	4.05	4.425	3.25
Strip, H.R., Chicago	4.05	4.05	4.05	3.925	3.25
Strip, C.R., Pittsburgh	5.75	5.75	5.75	5.45	4.15
Strip, C.R., Chicago	5.85	5.85	5.85	5.70	4.30
Strip, C.R., Detroit	5.90	5.90	5.90	5.65	4.35-.40
Wire, Basic, Pittsburgh	5.75	5.75	5.75	5.525	4.50
Nails, Wire, Pittsburgh	6.85	6.85	6.85	6.55	5.30
Tin Plate (1.50 lb), box, Pitts.	$9.06	$9.06	$9.06	$8.96	$7.50

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$78.00	$78.00	$78.00	$75.50	$63.00
Wire Rods, ¼-⅝" Pitts.	4.675	4.675	4.675	4.525	3.85

PIG IRON, Gross Ton					
Bessemer, Pitts.	$57.00	$57.00	$57.00	$57.00	$47.00
Basic, Valley	56.00	56.00	56.00	56.00	46.00
Basic, deld. Phila.	59.66	59.66	59.66	59.66	49.44
No. 2 Fdry, Pitts.	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, Valley	56.50	56.50	56.50	56.50	46.50
No. 2 Fdry, deld. Phila.	55.16	55.16	55.16	60.16	49.94
No. 2 Fdry, Birm.	52.88	52.88	52.88	52.88	42.38
No. 2 Fdry (Birm.) deld. Cin.	60.58	60.58	60.58	60.43	49.08
Malleable, Valley	56.50	56.50	56.50	56.50	46.50
Malleable, Chicago	56.50	56.50	56.50	56.50	46.50
Ferromanganese, Duquesne, 78-82% Mn	190.00†	190.00†	190.00†	200.00†	175.00*

*75-82% Mn, gross ton, Etna, Pa. †74-76% Mn, net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$38.50	$38.50	$38.50	$26.50	$32.25
No. 1 Heavy Melt, E. Pa.	37.75	37.75	39.00	22.00	26.00
No. 1 Heavy Melt, Chicago	36.00	36.00	35.00	27.50	29.00
No. 1 Heavy Melt, Valley	37.50	37.50	37.50	25.50	32.75
No. 1 Heavy Melt, Cleve.	35.00	35.00	35.00	22.50	29.25
No. 1 Heavy Melt, Buffalo	32.50	32.50	32.50	23.50	29.75
Rails, Rerolling, Chicago	52.50	52.50	49.50	34.50	46.50
No. 1 Cast, Chicago	41.50	41.50	40.00	38.50	41.00

COKE, Net Ton					
Beehive, Furn, Connisvl.	$13.75	$13.75	$13.75	$14.75	$14.25
Beehive, Fdry, Connisvl.	16.75	16.75	16.75	16.75	16.00
Oven, Fdry, Chicago	24.50	24.50	24.50	24.50	21.00

Daily Nonferrous Price Record

	Price Apr. 13	Last Change	Previous Price	Mar. Avg.	Feb. Avg.	Apr. 1954 Avg.
Copper	36.00	Mar. 29, 1955	33.00	33.222	33.000	29.955
Lead	14.80	Oct. 4, 1954	14.55	14.800	14.800	13.710
Zinc	12.00	Apr. 6, 1955	11.50	11.500	11.500	10.250
Tin	91.50	Apr. 13, 1955	91.375	87.194	90.908	96.269
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	60.000
Aluminum	23.20	Jan. 12, 1955	22.20	23.200	23.200	21.500
Magnesium	28.50	Mar. 21, 1955	27.00	27.556	27.000	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99+%, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

This is Illinois Gear

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South Works of the Illinois Gear & Machine Company, Chicago

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Main Offices and Works of the Illinois Gear & Machine Company, Chicago

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2108 NORTH NATCHEZ AVENUE • CHICAGO 35, ILLINOIS

Nonferrous Metals

Revere Copper & Brass will start birthmarking products in May. Single-stamp method will be used at first, with continuous marking a later possibility

BIRTHMARKING mill products, a throwback to World War II days, may be gaining a new foothold in the nonferrous field. Revere Copper & Brass Inc. will start next month to mark its standard sizes of sheet, strip and roll copper with gage, temper and company name.

For some metals people, this announcement will cause nary a ripple. Birthmarking has been kicked around for several years in the steel industry. The Big Three in aluminum either do it as standard practice or offer it as a service at a price extra. But in copper, the practice is not widespread. If customers like the service, other producers may follow Revere's lead.

Benefits—Revere officials hope that the markings will be of value to architects and contractors in checking deliveries against specifications and in helping to determine quickly if the copper is of domestic origin. Some unmarked foreign copper products in the past have not come up to specifications, especially regarding weight. With the new markings, Revere says the customer will know for sure he is "buying American."

At first, Revere will mark only standard-size sheets with a single mark on the selvage edge midway on the sheet. The ink will be water-soluble and easily removable. Markings will be extended later to coils and strip, and automatic continuous marking may be used. Officials state existing stocks of unmarked material will be exhausted before the marked material is shipped unless a customer specifies otherwise. Commercial shipments won't be marked.

Reactions — Warehousemen contacted by STEEL would welcome a continuous marking system for copper products. They point out that too often an inexperienced workman on the slitter will cut a small order from stock and forget to remark the remainder, or a lot will be broken and improperly remarked. The cost of a chemical analysis on the remaining material may be more than the value of the stock itself, resulting in a scrap loss. If the material were birthmarked, such losses could be kept at a minimum.

Zinc Stocks Take Tenth Decline

Smelters' stocks of slab zinc declined in March for the tenth consecutive month, but the reduction was the smallest since August, 1954. American Zinc Institute Inc. figures show April started with a stock of 90,837 tons, compared with 96,165 tons a month previous. The 5328-ton reduction compares with 20,987 tons for February and 4774 tons for last August. Higher production and lower shipments to government stockpile accounted for the slower rate of decline. Domestic shipments in March remained practically at February's level.

What's Behind Copper Ban

One of the unpublicized reasons behind governmental restriction of copper-base alloy ingot exports, says a Commerce department official, is that scrap exporters were melting down alloy scrap and shipping it as ingots. Copper-base alloy ingot exports had been steady for several quarters, with only about half a dozen exporters in the business. After scrap exports were restricted, both shipments and number of companies participating in the ingot trade began to rise. In a further effort to conserve domestic supplies of copper for domestic users, the additional quota was set to conform with the historical pattern. Licenses under the new rules will be distributed on the basis of past participation.

Market Memos

- Office of Defense Mobilization is studying gaps in aluminum fabricating facilities which should be filled to complete defense planning for the industry. The study will be on the basis of mobilization requirements for the first, second and third years of a hot war.
- A General Services Administration official told STEEL it appears that the government will continue to stockpile lead and zinc as long as the prices of the metals do not rise above a certain level—which is a closely guarded secret—or as long as there is danger of a price relapse if the program were stopped.
- Shipments of wrought magnesium products for February were up 56 per cent from February, 1954, although production in the same period was down 20.7 per cent. Sales for the month exceeded production by about 500,000 lb of ingot.
- R. S. Reynolds Jr., president, Reynolds Metals Co., told stockholders that construction, automobiles, irrigation pipe and foil are big factors in the marked optimism over increased aluminum demand in 1955.

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

Bridgeport Brass Co. — Reporting new developments in copper-base alloys and metalworking methods.

Bridgeport High I. Q. Brass gives rich gold color, high gloss finish to stylish vanity and lipstick cases. (Courtesy, Zell Products Corp., Norwalk, Conn.)

Beauty in Brass: A Story of the 4th Dimension

"Rich as gold," describes the deep warm color of Bridgeport 87 Brass. And, "polished as a mirror," describes the lustrous finish Zell Products Corp., Norwalk, Conn., gives to its line of vanity and lipstick cases. The success of this story belongs to the High I. Q. (Inner Quality) of Bridgeport brass strip, and the 4th Dimension, its optimum grain size.

The cases are made primarily by blanking, stamping and cupping thin strips of brass (Alloy 87); 87% copper, 13% zinc. Therefore, a certain amount of ductility is essential in the metal. The mirror-smooth polish is brought out by buffing, which calls for a fine grain size. The combination of these two qualities is a finely-balanced compromise to bring both properties to ideal working requirements.

Bridgeport supplies this exceptionally smooth metal, tailored to the customer's requirements—¼th hard and light anneal temper, with grain size between .015 and .025 mm. Metal of this temper provides an extremely smooth surface after forming which may be buffed to a high gloss with a minimum of labor and time. It has an ideal combination of ductility and ability to take a high polish for a great many profitable applications.

Many other combinations are also available, each suited to a particular range of forming and buffing requirements. So ask your Bridgeport Technical Service representative to assist in your metal selection. Make sure of the 4th Dimension—the right grain size to meet both product needs and production methods, for no one fine-grain brass does all jobs well.

Bridgeport Phosphor Bronze Makes Tough, Long-Wearing Clutch Plates

Since 1929, the Rockford Clutch Division of Borg-Warner Corp., Rockford, Ill., has used Bridgeport Phosphor Bronze Grade A (Alloy 36) for clutch outer discs in their Pullmore Multiple-Disc Clutches. They have used this alloy consistently because of its outstanding strength and superior resistance to wear under severe operating conditions, another example of properties assured by the High I. Q. (Inner Quality) of Bridgeport alloys.

The alloy is supplied by Bridgeport in strip form, rolled to an extra spring temper of 9 B&S numbers hard, and having correct surface finish to meet specifications. Automatic machines stamp blank discs, 1¾ in. to 10⅞ in. in diameter, from three thicknesses of strip; .062 in., .092 in. and .125 in. Each is then pierced with a large hole for the clutch shaft and with a series of small holes around the working periphery of the clutch disc. They are then flattened, heat treated to 500°F. The small holes are impregnated with graphite to complete the part.

The clutches in which these discs perform are used on main drives, auxiliary controls, and power take-off mechanism to obtain forward and reverse movements, or high and low speeds. They serve as both clutch and brake, and therefore must be rugged.

Clutch discs of Bridgeport High I. Q. Phosphor Bronze have high strength and wear resistance in heavy-duty service. (Courtesy Rockford Clutch Division, Borg-Warner Corp.)

Composed of approximately 95% copper and 5% tin, Bridgeport Phosphor Bronze Grade A (Alloy 36) has high resistance to fatigue and wear from rubbing against other materials, excellent spring properties under repeated flexing, and greater resistance to corrosive attack than most brasses and copper.

This alloy is also recommended for use in metal bellows for temperature and pressure control instruments, clutch discs, bridge bearing plates, screens and beater bars in many of the process industries; snap switches, spring contacts and other parts for electrical and electronic equipment.

For even more severe service, Bridgeport Phosphor Bronze Grade C (Alloy 35), composed of 92% copper and 8% tin, would be the preferred alloy. High I. Q. metals are produced with Inner Qualities to meet the most rigorous specifications of the industry. (3138)

Bridgeport Brass Co.

BRIDGEPORT BRASS COMPANY ◆ BRIDGEPORT, CONNECTICUT

Mills at Bridgeport, Conn., Indianapolis, Ind., and Adrian, Mich. Sales Offices in Principal Cities—Conveniently Located Warehouses

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 23.20, pigs 21.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 25.00; No. 43, 5% Si, 24.60; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 26.20; No. 195, 4.5% Cu, 0.8% Si, 25.80; No. 214, 3.8% Mg, 26.20; No. 356, 7% Si, 0.3% Mg, 24.90.

Antimony: R.M.M. brand, 99.5%, 28.50, Lone Star brand, 29.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $40 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $118.30 per lb, nom.

Copper: Electrolytic 36.00 deld. Conn. Valley; 36.00 deld. Midwest; Lake 36.00 deld; Fire refined 35.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $90-$120 nom. per troy oz.

Lead: Common 14.80, chemical 14.90, corroding 14.90, St. Louis; N. Y. basis, add 0.20.

Lithium: 99 + %, $13-$18 f.o.b. Minneapolis, depending on quantity and form. For rod, add $2 a lb; for wire, add $3 a lb.

Magnesium: 99.8%, self-palletizing pig 28.50; notched ingot 29.25, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40 for pig and 1.45 for ingot; for Madison, Ill., add 1.20 for pig and 1.25 for ingot; for Los Angeles, add 2.50 for both pig and ingot. Sticks 1.3 in. diameter, 49.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, H, G and R 34.00; alloy M 36.60, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40; for Madison, Ill., add 0.50; for Los Angeles, add 2.50.

Mercury: Open market, spot, New York, $317-$320 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced $3-$3.25 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked 64.50; 10-lb pigs, unpacked 67.65; "XX" nickel shot 69.00; "Y" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $120-$130, nom., per troy oz.

Palladium: $17-$20 per troy oz.

Platinum: $76-$80 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$56 per troy oz.

Selenium: 99.5%, $6-$7.25 per lb.

Silver: Open market, 87.00 per troy oz.

Sodium: 16.50, e.l.; 17.00 l.c.l.

Tantalum: Sheet, rod $68.70 per lb; powder $40.20 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 91.50; prompt, 91.375.

Titanium: Sponge, 99.3+ %, grade A-1 ductile (0.2% Fe max) $3.95, grade A-2 (0.5% Fe max) $3.50 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots $4.35-$4.40 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $4.65. Treated ingots $6.70.

Zinc: Prime Western, 12.00; brass special 12.25; intermediate, 12.50, E. St. Louis, freight allowed over 0.50 per pound. High grade, 13.35; special high grade, 13.50. Diecasting alloy ingot No. 3, 16.00; Nos. 2 and 5, 16.50.

Zirconium: Sponge $10 per lb; powder electronics grade $15, flash grade $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloy, 29.00-30.00; No. 12 foundry alloy (No. 2 grade), 28.50-29.50; 5% silicon alloy, 0.60 Cu max, 30.25-31.25; 13 alloy, 0.60 Cu max, 30.25-31.25; 195 alloy, 30.25-31.50; 108 alloy, 29.00-30.00. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 30.25-31.50; grade 2, 29.00-30.50; grade 3, 28.00-29.50; grade 4, 27.00-28.75.

Brass Ingot: Red brass No. 115, 37.00; tin bronze No. 225, 48.50; No. 245, 42.25; high-leaded tin bronze No. 305, 41.00; No. 1 yellow, No. 405, 32.25; manganese bronze No. 421, 34.75.

Magnesium Alloy Ingot: AZ63A, 31.00; AZ91B, 26.00; AZ91B, 31.00; AZ92A, 31.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.74; rod, bar, wire, $1.71.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 41.35-42.45; 30,000-lb lots, 41.48-42.58; l.c.l., 41.98-43.08. Weatherproof, 100,000 lb, 40.78-41.60; 30,000 lb, 41.03-41.85; l.c.l., 41.53-42.35. Magnet wire deld., 15,000 lb or more, 48.15-49.31; l.c.l., 48.90-50.06.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more $20 per cwt; pipe, full coils $20 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forging billets, $9; hot-rolled and forged bars, $9.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets 23.00, ribbon zinc in coils, 19.50-20.50; plates 18.50-22.25.

ZIRCONIUM

Plate $37; H.R. strip $28; C.R. strip $35; forged or H.R. bars $27; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	102	78	99
Strip, C.R.	102	87	125
Plate, H.R.	97	83	95
Rod, Shapes H.R.	87	69	93
Rod, Shapes C.R.	91	75	115
Seamless Tubes	122	105	153
Shot, Blocks	...	65	...

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	43.5	62.0	...	...
0.156-0.172	53.9	52.3	...	...
0.188	53.9	52.3	...	66.8
0.219-0.234	51.1	49.5	...	...
0.250-0.281	51.1	49.5	...	63.7
0.313	51.1	49.5	...	60.8
Cold-finished				
0.375-0.547	49.9	47.8	59.8	57.2
0.563-0.688	49.9	47.8	56.9	53.7
0.750-1.000	48.7	46.3	52.1	50.6
1.063	48.7	46.3	...	48.9
1.125-1.500	46.9	44.6	50.4	48.9
Rolled				
1.563	45.7	43.4	...	...
1.625-2.000	45.1	42.8	...	47.2
2.125-2.500	44.0	41.7	...	...
2.563-3.375	42.7	40.5	...	...

ALUMINUM

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed over 499 lb)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	35.9	40.4	...	...
0.135-0.096	36.4	41.3	...	...
0.095-0.077	37.1	42.3	34.8	39.6
0.076-0.061	37.7	43.2	34.8	39.5
0.060-0.048	38.2	42.6	35.1	40.3
0.047-0.035	38.7	44.5	35.6	40.6
0.037-0.030	39.1	45.0	36.0	41.3
0.029-0.024	39.7	45.5	36.3	41.8
0.023-0.019	40.4	46.9	37.1	42.6
0.018-0.017	41.2	...	37.7	43.5
0.016-0.015	42.1	...	38.5	44.7
0.014	43.1	...	39.5	46.0
0.013-0.012	44.3	...	40.2	47.0
0.011	45.3	...	41.4	48.6
0.010-0.0095	46.5	...	42.5	50.2
0.009-0.0085	47.8	...	44.0	52.3
0.008-0.0075	49.4	...	45.2	54.1
0.007	50.9	...	46.7	56.4
0.006	52.5	...	48.1	61.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	34.6	38.8
5050-F	35.7	39.9
3004-F	36.7	41.8
5052-F	38.4	43.4
6061-T6	39.6	44.0
2024-T4*	41.5	47.9
7075-T6*	49.6	56.2

*24-48 in. widths or diam, 72-180 in. lengths

ALUMINUM

Forging Stock: Round, Class 1, 47.80-37.30, in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 53.60-41.00 in random lengths, 0.375-4 in. thick, widths 0.750-10 in.

Pipe: A.S.A. Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16.10	3	$ 49.55
1	25.35	4	136.65
1¼	34.30	6	244.90
1½	41.00	8	368.50

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 97.00, 0.064-in. 76.00, 0.125-in. 61.50, 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled AZ31, 59.00, 30,000 lb or more, 0.250 in. and over, widths to 48 in., lengths to 144 in.; raised pattern floor plate, 62.00, 30,000 lb or more, ¼-in. thick, widths 24-72 in., lengths 60-192 in.

Extrusion Stock: AZ31, Rectangles, ¼ x 2 in., 72.20; 1 x 4 in., 67.00. Rod, 1 in., 69.00; 2 in., 66.50. Tubing, 1 in. OD x 0.065 in., 90.00. Angles, 1 x 1 x ⅛-in., 75.90; 2 x 2 x ¼-in., 70.00. Channels, 5 in., 70.90. I-beams, 5 in., 70.20.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings 17.50-18.50; old sheet 14.00-16.00; borings and turnings 9.50-10.50; crankcases 14.00-16.00; industrial castings 14.00-16.00.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.76b	52.36c	....	54.82	32.000	32.000	31.250
Yellow Brass	46.27	46.21d	46.81	49.18	23.875	26.625	22.000
Red Brass, 85%	50.99	50.93	51.53	53.80	28.125	27.875	27.375
Low Brass, 80%	49.75	49.69	50.29	52.56	27.000	26.750	26.750
Naval Brass	49.99	44.30	57.05	53.15	32.125	31.875	31.375
Com. Bronze, 90%	52.78	52.72	53.32	55.34	30.250	29.000	28.500
Nickel Silver, 10%	60.20	62.53g	63.53	....	27.625	27.375	13.813
Phos. Bronze, A, 5%	73.03	73.53	73.53	74.71	32.250	32.000	31.000
Silicon Bronze	58.82	58.01	58.86	60.80e	31.125	30.875	30.125
Manganese Bronze	53.73	47.83	58.24	....	22.125	21.875	21.375
Munts Metal	48.14	43.95	....	....	22.375	22.125	21.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

Copper and Brass: No. 1 heavy copper and wire 31.50-32.00; No. 2 copper 30.00-30.50; light copper 28.50-29.00; No. 1 composition red brass 26.00-26.50; No. 1 composition turnings 25.00-25.50; yellow brass turnings 16.00-16.50; new brass clippings 21.50-22.00; No. 1 brass rod turnings 19.00; light brass 17.00-17.50; heavy yellow brass 18.50-19.00; new brass rod ends 19.50-21.00; auto radiators, unsweated 20.00-20.50; cocks and faucets 20.50-21.00; brass pipe 20.00-20.50.

Lead: Heavy 11.50-11.75; battery plate 6.00-6.75; linotype and stereotype 13.50-14.50; electrotype 12.00-12.50; mixed babbitt 12.00-14.00.

Magnesium: Clippings 18.50-19.50; clean castings 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings 28.00-34.00; old sheet 26.00-30.00; turnings 21.00; rods 28.00-34.00.

Nickel: Sheets and clips 57.00-70.00; rolled anodes 57.00-70.00; turnings 40.00-55.00; rod ends 57.00-70.00.

Tin: No. 1 pewter 50.00-55.00; block tin pipe 70.00-75.00; No. 1 babbitt 45.00-48.00.

Zinc: Old zinc 4.75-5.50; new die cast scrap 4.75-5.00; old die cast scrap 3.25-3.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 20.50-21.50; 3003 clippings, 20.50-21.50; 6151 clippings, 20.50-21.50; 5052 clippings, 20.50-21.50; 2014 clippings, 19.50-20.50; 2017 clippings; 19.50-20.50; 2024 clippings, 19.50-20.50; mixed clippings, 19.50-20.50; old sheet, 18.00-18.50; old cast 18.00-18.50; clean old cable (free of steel), 20.50-21.50; borings and turnings, 18.50-19.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 48.00; light scrap 43.00.

Copper, Brass: No. 1 copper, 35.50-36.00; No. 2 copper, 34.00-34.50; light copper, 32.25; refinery brass (60% copper) per dry copper content, 31.00.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper, 35.00-35.50; No. 2 copper, 33.00; light copper, 31.25; No. 1 composition borings, 28.00-28.50; No. 1 composition solids, 28.50-29.00; heavy yellow brass solids, 22.00-22.50; yellow brass turnings, 21.50; radiators, 23.00-23.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes $1.70 per lb.

Copper: Flat-rolled 51.42, oval 50.92, 5000-10,000 lb; electrodeposited 49.40, 2000-5000 lb lots; cast 50.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb $1.015; 100-499 lb 99.50; 500-4999 lb 95.50; 5000-29,999 lb 93.50; 30,000 lb 91.50. Carbonized, deduct 2 cents a lb. All prices eastern delivery effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb $1.095; 200-499 lb $1.08; 500-999 lb $1.075; 1000 lb or more $1.07.

Zinc: Bar 20.00, bar or flat top 19.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb 28.50; over 10,000 lb 27.50.

Copper Cyanide: 100 lb 76.80; 200 lb 76.05; 300 lb 75.80; 400-900 lb 75.05; 1000 lb and over 73.05; effective Mar. 24, 1955.

Copper Sulphate: Crystal, 100 lb 21.50; 200 lb 18.50; 300 lb 17.50; 400 lb 17.00; 500-1900 lb 15.50; 2000-10,000 lb 15.25; 10,000 lb and up 15.15. Powder, add 0.5 to above prices. Effective Mar. 29, 1955.

Nickel Chloride: 100 lb 46.50; 200 lb 44.50; 300 lb 43.50; 400-4900 lb 41.50; 5000-9900 lb 39.50; 10,000 lb and over 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb 38.25; 200 lb 36.25; 300 lb 35.25; 400-4900 lb 33.25; 5000-35,900 lb 31.25; 36,000 lb 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 83.125; 16-oz bottle, 81.875; 80-oz bottle, 79.375; 100-oz bottle, 79.375; f.o.b. St. Louis, New York and Los Angeles. Effective Apr. 6, 1955.

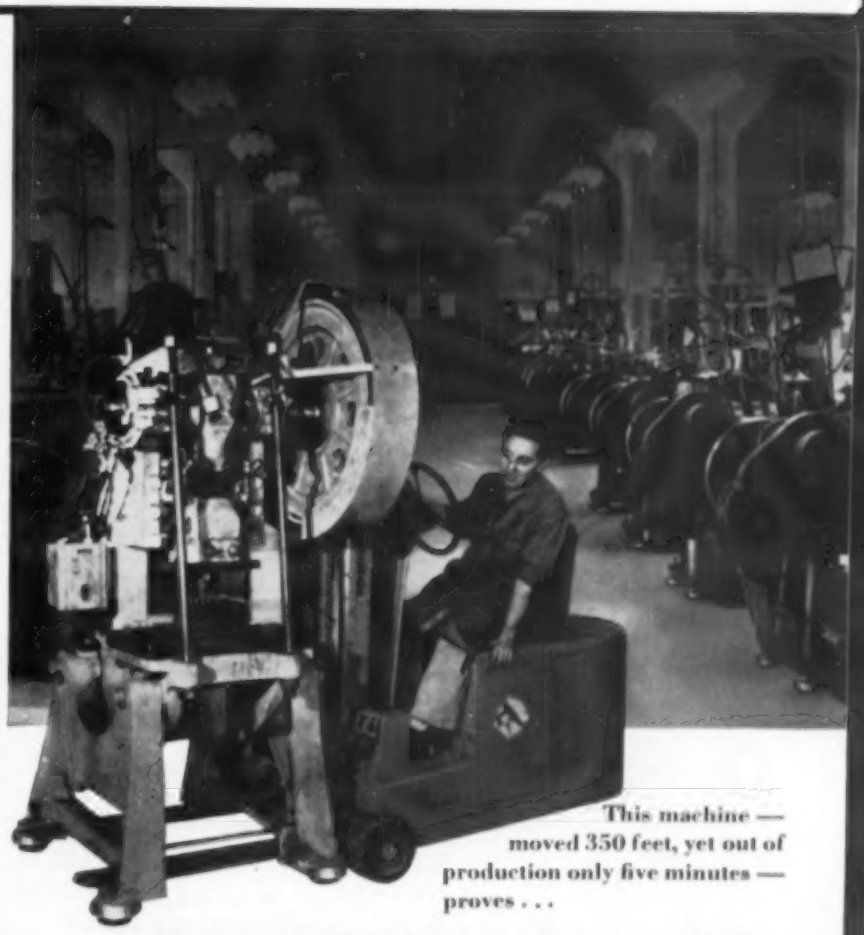
Sodium Cyanide: Egg, under 1000 lb 19.80; 1000-19,900 lb 18.80; 20,000 lb and over 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb 70.10; 100-600 lb 55.90; 700-1900 lb 53.40; 2000-9900 lb 51.70; 10,000 lb or more 50.60.

Stannous Chloride (Anhydrous): Less than 50 lb $1.558; 50 lb $1.215, 100-300 lb $1.068, 400-900 lb $1.043; 1000-1900 lb $1.019; 2000-4900 lb 98.20; 5000-19,900 lb 92.10, 20,000 lb and over 88.00.

Stannous Sulphate: Less than 5 lb $1.258; 50 lb 95.80; 100-1900 lb 93.80; 2000 lb and over 91.80.

Zinc Cyanide: Under 1000 lb 54.30; 1000 lb and over 52.30.



This machine — moved 350 feet, yet out of production only five minutes — proves . . .

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SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company. Key on page 153. Key to footnotes, page 155.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $61.50

INGOTS, Alloy (NT)

Detroit R7 ..... $65.00
Houston 85 ..... 70.00
Midland,Pa. C18 ..... 65.00
Munhall,Pa. U5 ..... 65.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5 .... $64.00
Bessemer,Pa. U5 .... 64.00
Bridgeport,Conn. N19 .. 69.00
Buffalo R2 .... 64.00
Clairton,Pa. U5 .... 64.00
Ensley,Ala. T2 .... 64.00
Fairfield,Ala. T2 .... 64.00
Fontana,Calif. K1 .... 72.00
Gary,Ind. U5 .... 64.00
Johnstown,Pa. B2 .... 64.00
Lackawanna,N.Y. B2.. 64.00
Munhall,Pa. U5 .... 64.00
Pittsburgh J5 .... 64.00
So.Chicago,Ill. R2, U5.. 64.00
So.Duquesne,Pa. U5 .. 64.00
Youngstown R2 .... 64.00

Carbon, Forging (NT)

Aliquippa,Pa. J5 .... $78.00
Bessemer,Pa. U5 .... 78.00
Bridgeport,Conn. N19 .. 83.00
Buffalo R2 .... 78.00
Canton,O. R2 .... 80.00
Clairton,Pa. U5 .... 78.00
Conshohocken,Pa. A3 .. 83.00
Ensley,Ala. T2 .... 78.00
Fairfield,Ala. T2 .... 78.00
Fontana,Calif. K1 .... 86.00
Gary,Ind. U5 .... 78.00
Geneva,Utah C11 .... 78.00
Houston 85 .... 83.00
Johnstown,Pa. B2 .... 78.00
Lackawanna,N.Y. B2 .. 78.00
LosAngeles B3 .... 87.50
Midland,Pa. C18 .... 78.00
Munhall,Pa. U5 .... 78.00
Pittsburgh J5 .... 78.00
Seattle B3 .... 91.50
So.Chicago R2,U5,W14 .. 78.00
So.Duquesne,Pa. U5 .. 78.00
So.SanFrancisco B3 .. 87.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 .... $86.00
Buffalo R2 .... 86.00
Canton,O. R2, T7 .... 86.00
Conshohocken,Pa. A3 .. 93.00
Detroit R7 .... 86.00
Fontana,Calif. K1 .... 100.00
Gary,Ind. U5 .... 86.00
Houston 85 .... 91.00
Ind.Harbor,Ind. Y1 .... 86.00
Johnstown,Pa. B2 .... 86.00
Lackawanna,N.Y. B2 .. 86.00
LosAngeles B3 .... 106.00
Massillon,O. R2 .... 86.00
Midland,Pa. C18 .... 86.00
Munhall,Pa. U5 .... 86.00
So.Chicago, R2,U5,W14 .. 86.00
So.Duquesne,Pa. U5 .. 86.00
Struthers,O. Y1 .... 86.00
Warren,O. C17 .... 86.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .... $96.50
Canton,O. R2 .... 96.50
Cleveland R2 .... 96.50
Gary,Ind. U5 .... 96.50
So.Chicago R2, W14 .. 96.50
So.Duquesne,Pa. U5 .. 96.50

SKELP

Aliquippa,Pa. J5 .... 4.00
Fontana,Calif. K1 .... 4.775
Munhall,Pa. U5 .... 3.90
SparrowsPoint,Md. B2.. 3.90
Warren,O. R2 .... 3.90
Youngstown R2, U5 .... 3.90

WIRE RODS

AlabamaCity,Ala. R2 .. 4.675
Aliquippa,Pa. J5 .... 4.675
Alton,Ill. L1 .... 4.85
Buffalo B11, W12 .... 4.675
Cleveland A7 .... 4.675
Donora,Pa. A7 .... 4.675
Fairfield,Ala. T2 .... 4.675
Fontana,Calif. K1 .... 5.475
Houston 85 .... 4.925
IndianaHarbor,Ind. Y1 .. 4.675
Johnstown,Pa. B2 .... 4.675
Joliet,Ill. A7 .... 4.675
KansasCity,Mo. 85 .... 4.925
Kokomo,Ind. C16 .... 4.775
LosAngeles B3 .... 5.475
Minnequa,Colo. C10 .. 4.925
Monessen,Pa. P7 .... 4.675
No.Tonawanda,N.Y. B11 4.675
Pittsburg,Calif. C11 .... 5.325
Portsmouth P12 .... 4.675
Roebling,N.J. R5 .... 4.775
So.Chicago,Ill. R2 .... 4.675
SparrowsPoint,Md. B2.. 4.775
Sterling,Ill.(1) N15 .. 4.675
Sterling,Ill. N15 .... 4.775
Struthers,O. Y1 .... 4.675
Torrance,Calif. C11 .... 5.475
Worcester,Mass. A7 .. 4.975

STRUCTURALS

Carbon Steel Stand. Shapes

Ala.City,Ala. R2 .... 4.25
Aliquippa,Pa. J5 .... 4.25
Bessemer,Ala. T2 .... 4.25
Bethlehem,Pa. B2 .... 4.30
Birmingham C15 .... 4.25
Clairton,Pa. U5 .... 4.25
Fairfield,Ala. T2 .... 4.25
Fontana,Calif. K1 .... 4.90
Gary,Ind. U5 .... 4.25
Geneva,Utah C11 .... 4.25
Houston 85 .... 4.30
Ind.Harbor,Ind. I-2 .... 4.25
Johnstown,Pa. B2 .... 4.30
KansasCity,Mo. 85 .... 4.30
Lackawanna,N.Y. B2 .. 4.30
LosAngeles B3 .... 4.95
Minnequa,Colo. C10 .... 4.70
Munhall,Pa. U5 .... 4.25
Niles,Calif. P1 .... 4.90
Portland,Oreg. O4 .... 5.00
Phoenixville,Pa. 4.20
Seattle B3 .... 5.00
So.Chicago U5, W14 .... 4.25
So.SanFrancisco B3 .... 4.90
Torrance,Calif. C11 .... 4.95
Weirton,W.Va. W6 .... 4.25

Wide Flange

Bethlehem,Pa. B2 .... 4.30
Clairton,Pa. U5 .... 4.25
Fontana,Calif. K1 .... 5.25
Lackawanna,N.Y. B2 .. 4.30
Munhall,Pa. U5 .... 4.25
Phoenixville,Pa. P4 .... 4.30
So.Chicago,Ill. U5 .... 4.25

Alloy Stand. Shapes

Clairton,Pa. U5 .... 5.20
Fontana,Calif. K1 .... 6.80
Gary,Ind. U5 .... 5.20
Houston 85 .... 5.25
Munhall,Pa. U5 .... 5.20
So.Chicago,Ill. U5 .... 5.20

H.S., L.A. Stand. Shapes

Aliquippa,Pa. J5 .... 6.40
Bessemer,Ala. T2 .... 6.40
Bethlehem,Pa. B2 .... 6.45
Clairton,Pa. U5 .... 6.40
Fairfield,Ala. T2 .... 6.40
Fontana,Calif. K1 .... 7.05
Gary,Ind. U5 .... 6.40
Geneva,Utah C11 .... 6.40
Houston 85 .... 6.45
Ind.Harbor,Ind. I-2, Y1 .. 6.40
Johnstown,Pa. B2 .... 6.45
KansasCity,Mo. 85 .... 6.45
Lackawanna,N.Y. B2 .. 6.45
LosAngeles B3 .... 7.10
Munhall,Pa. U5 .... 6.40
Seattle B3 .... 7.15
So.Chicago,Ill. U5, W14 .. 6.40
So.SanFrancisco B3 .... 7.05
Struthers,O. Y1 .... 6.40

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .... 6.45
Lackawanna,N.Y. B2 .. 6.45
Munhall,Pa. U5 .... 6.40
So.Chicago,Ill. U5 .... 6.40

PILING

BEARING PILES

Munhall,Pa. U5 .... 4.25
So.Chicago,Ill. U5 .... 4.26

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 .. 5.075
Lackawanna,N.Y. B2 .. 5.075
Munhall,Pa. U5 .... 5.075
So.Chicago,Ill. U5 .... 5.075

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .... 4.225
Aliquippa,Pa. J5 .... 4.225
Ashland,Ky.(15) A10 .. 4.225
Bessemer,Ala. T2 .... 4.225
Bridgeport,Conn. N19 .. 4.475
Buffalo R2 .... 4.225
Clairton,Pa. U5 .... 4.225
Claymont,Del. C22 .... 4.225
Cleveland J5, R2 .... 4.225
Coatesville,Pa. L7 .... 4.225
Conshohocken,Pa. A3 .. 4.225
Ecorse,Mich. G5 .... 4.325
Fairfield,Ala. T2 .... 4.225
Fontana,Calif.(30) K1.. 4.875
Gary,Ind. U5 .... 4.225
Geneva,Utah. C11 .... 4.225
GraniteCity,Ill. G4 .... 4.425
Harrisburg,Pa. C5 .... 4.225
Houston 85 .... 4.275
Ind.Harbor,Ind. I-2, Y1.. 4.225
Johnstown,Pa. B2 .... 4.225
Lackawanna,N.Y. B2 .. 4.225
LoneStar,Tex. L6 .... 4.55
Mansfield,O. E6 .... 4.225
Minnequa,Colo. C10 .. 5.075
Munhall,Pa. U5 .... 4.225
Newport,Ky. N9 .... 4.225
Pittsburgh J5 .... 4.225
Riverdale,Ill. A1 .... 4.225
Seattle B3 .... 5.125
Sharon,Pa. S3 .... 4.225
So.Chicago R2, U5, W14 .. 4.225
SparrowsPoint,Md. B2.. 4.225
Steubenville,O. W10 .. 4.225
Warren,O. R2 .... 4.225
Weirton,W.Va. W6 .... 4.225
Youngstown R2,U5,Y1.. 4.225

PLATES, Carbon Abras. Resist.

Fontana,Calif. K1 .... 6.025
Geneva,Utah C11 .... 5.375

PLATES, Wrought Iron

Economy,Pa. B14 .... 9.80

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .... 6.45
Bessemer,Ala. T2 .... 6.45
Clairton,Pa. U5 .... 6.45
Cleveland J5, R2 .... 6.45
Coatesville,Pa. L7 .... 6.45
Conshohocken,Pa. A3 .. 6.45
Ecorse,Mich. G5 .... 6.55
Fairfield,Ala. T2 .... 6.45
Fontana,Calif. (30) K1.. 7.15
Gary,Ind. U5 .... 6.45
Geneva,Utah C11 .... 6.45
Houston 85 .... 6.50
Ind.Harbor,Ind. I-2, Y1.. 6.45
Johnstown,Pa. B2 .... 6.45
Lackawanna,N.Y. B2 .. 6.45
LosAngeles B3 .... 7.35
Munhall,Pa. U5 .... 6.45
Pittsburgh J5 .... 6.45
Seattle B3 .... 7.35
Sharon,Pa. S3 .... 6.45
So.Chicago,Ill. U5, W14 .. 6.45
SparrowsPoint,Md. B2 .. 6.45
Youngstown U5, Y1 .... 6.45

PLATES, Alloy

Claymont,Del. C22 .... 5.80
Coatesville,Pa. L7 .... 5.80
Fontana,Calif. K1 .... 6.45
Gary,Ind. U5 .... 5.80
Houston 85 .... 5.85
Ind.Harbor,Ind. Y1 .... 5.80
Johnstown,Pa. B2 .... 5.80
Munhall,Pa. U5 .... 5.80
Newport,Ky. N9 .... 5.80
Seattle B3 .... 6.70
Sharon,Pa. S3 .... 5.80
So.Chicago,Ill. U5, W14 .. 5.80
SparrowsPoint,Md. B2.. 5.80
Youngstown Y1 .... 5.80

FLOOR PLATES

Cleveland J5 .... 5.275
Conshohocken,Pa. A3 .. 5.275
Harrisburg,Pa. C5 .... 5.275
Ind.Harbor,Ind. I-2 .... 5.275
Munhall,Pa. U5 .... 5.275
So.Chicago,Ill. U5 .... 5.275

PLATES, Ingot Iron

Ashland c.l. (15) A10.. 4.475
Ashland l.c.l. (15) A10 .. 4.975
Cleveland c.l. R2 .... 4.825
Warren,O. c.l. R2 .... 4.825

BARS

BAR, Hot-Rolled Carbon

Ala.City,Ala. R2 .... 4.30
Aliquippa,Pa. J5 .... 4.30
Alton,Ill. L1 .... 4.80
Atlanta A11 .... 4.50
Bessemer, Ala. T2 .... 4.30
Birmingham C15 .... 4.30
Bridgeport,Conn. N19 .. 4.55
Buffalo R2 .... 4.30
Canton,O. R2 .... 4.40
Clairton,Pa. U5 .... 4.30
Cleveland R2 .... 4.30
Ecorse,Mich. G5 .... 4.40
Emeryville,Calif. J7 .... 5.05
Fairfield,Ala. T2 .... 4.30
FairlessHills,Pa. U5 .... 4.45
Fontana,Calif. K1 .... 5.00
Gary,Ind. U5 .... 4.30
Houston 85 .... 4.55
Ind.Harbor,Ind. I-2, Y1.. 4.30
Johnstown,Pa. B2 .... 4.30
KansasCity,Mo. 85 .... 4.55
Lackawanna,N.Y. B2 .. 4.30
LosAngeles B3 .... 5.00
Massillon,O. R2 .... 4.40
Midland,Pa. C18 .... 4.30
Milton,Pa. M18 .... 4.30
Minnequa,Colo. C10 .... 4.75
Niles,Calif. P1 .... 5.00
N.Tonawanda,N.Y. B11.. 4.30
Pittsburg,Calif. C11.... 5.00
Pittsburgh J5 .... 4.30
Portland,Oreg. O4 .... 5.05
Seattle B3, N14, P23 .... 5.05
So.Chicago, R2,U5,W14.. 4.30
So.Duquesne,Pa. U5 .... 4.30
So.SanFran.,Calif. B3 .. 5.05
Sterling,Ill.(1) N15 .... 4.30
Sterling,Ill. N15 .... 4.40
Struthers,O. Y1 .... 4.30
Torrance,Calif. C11 .... 5.00
Warren,O. R2 .... 4.30
Weirton,W.Va. W6 .... 4.30
Youngstown R2, U5 .... 4.30

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .... 5.075
Bridgeport,Conn. N19 .. 5.225
Buffalo R2 .... 5.075
Canton,O. R2, T7 .... 5.075
Clairton,Pa. U5 .... 5.075
Detroit R7 .... 5.075
Ecorse,Mich. G5 .... 5.175
Fontana,Calif. K1 .... 6.125
FairlessHills,Pa. U5 .. 5.225
Gary,Ind. U5 .... 5.075
Houston 85 .... 5.325
Ind.Harbor,Ind. I-2, Y1 .. 5.075
Johnstown,Pa. B2 .... 5.075
KansasCity,Mo. 85 .... 5.325
Lackawanna,N.Y. B2 .. 5.075
LosAngeles B3 .... 6.125
Massillon,O. R2 .... 5.075
Midland,Pa. C18 .... 5.075
So.Chicago R2,U5,W14.. 5.075
So.Duquesne,Pa. U5 .... 5.075
Struthers,O. Y1 .... 5.075
Warren,O. C17 .... 5.075
Youngstown U5 .... 5.075

BARS, H.R. Leaded Alloy

Warren,O. C17 .... 5.825

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .... 6.45
Bessemer,Ala. T2 .... 6.45
Bethlehem,Pa. B2 .... 6.45
Clairton,Pa. U5 .... 6.45
Cleveland R2 .... 6.45
Ecorse,Mich. G6 .... 6.55
Fairfield,Ala. T2 .... 6.45
Fontana,Calif. K1 .... 7.70
Gary,Ind. U5 .... 6.45
Houston 85 .... 6.70
Ind.Harb.,Ind. I-2, Y1.. 6.45
Johnstown,Pa. B2 .... 6.45
KansasCity,Mo. 85 .... 6.70
Lackawanna,N.Y. B2 .. 6.45
LosAngeles B3 .... 7.15
Pittsburgh J5 .... 6.45
Seattle B3 .... 7.20
So.Chicago W14 .... 6.45
So.Duquesne,Pa. U5 .... 6.45
So.SanFrancisco B3 .... 7.20
Struthers,O. Y1 .... 6.45
Warren,O. R2 .... 6.45
Youngstown U5 .... 6.45

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2 .... 4.45

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .... 4.30
Atlanta A11 .... 4.50
Fontana,Calif. K1 .... 5.00
Niles,Calif. P1 .... 5.00
Pittsburgh J5 .... 4.30
Portland,Oreg. O4 .... 5.05
SanFrancisco S7 .... 4.70

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .... 5.20
Gary,Ind. U5 .... 5.20
Houston 85 .... 5.45
KansasCity,Mo. 85 .... 5.45
Youngstown U5 .... 5.20

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .... 5.40
BeaverFalls,Pa. M12, R2 .. 5.40
Buffalo B5 .... 5.45
Camden,N.J. P13 .... 5.85
Carnegie,Pa. C12 .... 5.40
Chicago W18 .... 5.40
Cleveland A7, C20 .... 5.40
Detroit R7 .... 5.40
Detroit B5, P17 .... 5.80
Donora,Pa. A7 .... 5.40
Elyria,O. W8 .... 5.40
FranklinPark,Ill. N5 .... 5.40
Gary,Ind. R2 .... 5.40
GreenBay,Wis. F7 .... 5.40
Hammond,Ind. L2, M13.. 5.40
Hartford,Conn. R2 .... 5.90
Harvey,Ill. B5 .... 5.40
LosAngeles R2, S30 .... 6.85
Mansfield,Mass. B5 .... 5.95
Massillon,O. R2, R8 .... 5.40
Midland,Pa. C18 .... 5.40
Monaca,Pa. S17 .... 5.40
Newark,N.J. W18 .... 5.85
NewCastle,Pa.(17) B4 .. 5.40
Pittsburgh J5 .... 5.40
Plymouth,Mich. P5 .... 5.95
Putnam,Conn. W18 .... 5.95
Readville,Mass. C14 .... 5.95
So.Chicago,Ill. W14 .... 5.40
SpringCity,Pa. K3 .... 5.85
Struthers,O. Y1 .... 5.40
Waukegan,Ill. A7 .... 5.40
Worcester,Mass. W19 .... 5.85
Youngstown F3, Y1 .... 5.40

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.. 4.65

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .... 6.635
BeaverFalls,Pa. M12,R2 6.635
Bethlehem,Pa. B2 .... 6.625
Buffalo B5 .... 6.625
Camden,N.J. P13 .... 6.80
Canton,O. T7 .... 6.635
Carnegie,Pa. C12 .... 6.625
Chicago W18 .... 6.625
Cleveland A7, C20 .... 6.625
Detroit R7 .... 6.625
Detroit B5, P17 .... 6.825
Donora,Pa. A7 .... 6.635
Elyria,O. W8 .... 6.635
Gary,Ind. R2 .... 6.625
GreenBay,Wis. F7 .... 6.625
Hammond,Ind. L2, M13.. 6.635
Hartford,Conn. R2 .... 6.925
Harvey,Ill. B5 .... 6.635
Lackawanna,N.Y. B2 .. 6.625
LosAngeles S30 .... 8.30
Mansfield,Mass. B5 .... 6.925
Massillon,O. R2, R8 .... 6.635
Midland,Pa. C18 .... 6.625
Monaca,Pa. S17 .... 6.635
Newark,N.J. W18 .... 6.80
Plymouth,Mich. P5 .... 6.825
So.Chicago W14 .... 6.625
SpringCity,Pa. K3 .... 6.80
Struthers,O. Y1 .... 6.635
Warren,O. C17 .... 6.625
Waukegan,Ill. A7 .... 6.635
Worcester,Mass. A7 .... 6.925
Youngstown F3, Y1 .... 6.625

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 .... 7.525
Camden,N.J. P13 .... 7.70
Carnegie,Pa. C12 .... 7.525
Chicago W18 .... 7.525
Cleveland C20 .... 7.525
Monaca,Pa. S17 .... 7.525
Newark,N.J. W18 .... 7.70
SpringCity,Pa. K3 .... 7.70
Warren,O. C17 .... 7.525

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .... 4.30
Atlanta A11 .... 4.50
Birmingham C15 .... 4.30
Buffalo R2 .... 4.30
Cleveland R2 .... 4.30
Emeryville,Calif. J7 .... 5.05
Fairfield,Ala. T2 .... 4.30
FairlessHills,Pa. U5 .... 4.45
Fontana,Calif. K1 .... 5.00
Ft.Worth,Tex.(42) T4 .. 4.90
Gary,Ind. U5 .... 4.30
Houston 85 .... 4.55

Ind.Harbor,Ind. I-2, Y1 4.30
Johnstown,Pa. B2 ..... 4.30
KansasCity,Mo. S5 ..... 4.55
Lackawanna,N.Y. B2 ..... 4.30
LosAngeles B3 ..... 5.00
Milton,Pa. M18 ..... 4.30
Minnequa,Colo. C10 ..... 4.75
Niles,Calif. P1 ..... 5.00
Pittsburg,Calif. C11 ..... 5.00
Pittsburgh J5 ..... 4.30
Portland,Oreg. O4 ..... 5.05
SandSprings,Okla. S5 ..... 4.80
Seattle B3, N14, P23 ..... 5.00
So.Chicago R2 ..... 4.30
So.Duquesne,Pa. U5 ..... 4.30
So.SanFrancisco B3 ..... 5.05
SparrowsPoint,Md. B2 ..... 4.30
Sterling,Ill.(1) N15 ..... 4.20
Sterling,Ill. N15 ..... 4.40
Struthers,O. Y1 ..... 4.30
Torrance,Calif. C11 ..... 5.00
Youngstown R3, U5 ..... 4.30

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ¼-1" B2 .. 5.70
KansasCity,Kans. S5 ..... 6.50
LosAngeles B3 ..... 5.95
Marion,O. P11 ..... 5.55
Pittsburgh J5, U5 ..... 5.72
Seattle B3, N14, P23 ..... 6.15
So.SanFrancisco B3 ..... 6.00
SparrowsPt. ¼-1" B2 .. 5.70
Williamsport,Pa. S19 ..... 5.60

RAIL STEEL BARS

Avis,Pa.(3) J8 ..... 4.25
ChicagoHts.(3) C2, I-2 .. 4.20
ChicagoHts.(4) C2, I-2 .. 4.30
Ft.Worth,Tex.(26) T4 .. 4.75
Franklin,Pa.(3) P5 ..... 4.20
Franklin,Pa.(4) P5 ..... 4.30
Marion,O.(3) P11 ..... 4.20
Moline,Ill(3) R2 ..... 4.30
Tonawanda(3) B12 ..... 4.15
Tonawanda(4) B12 ..... 4.30
Williamsport,Pa.(3) S19 4.30

BARS, Wrought Iron

Economy,Pa.(S.R.) B14 10.85
Economy,Pa.(D.R.) B14 13.50
Economy(Staybolt) B14 13.80
McK.Rks(S.R.) L5 ..... 10.85
McK.Rks.(D.R.) L5 ..... 14.75
McK.Rks.(Staybolt) L5 16.25

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala R3 ..... 4.05
Allenport,Pa. P7 ..... 4.05
Ashland,Ky.(8) A10 ..... 4.05
Cleveland J5, R2 ..... 4.05
Conshohocken,Pa. A3 ..... 4.10
Detroit(8) M1 ..... 4.15
Dravosburg,Pa. U5 ..... 4.05
Ecorse,Mich. G5 ..... 4.15
Fairfield,Ala. T2 ..... 4.05
FairlessHills,Pa. U5 ..... 4.10
Fontana,Calif. K1 ..... 4.825
Gary,Ind. U5 ..... 4.05
Geneva,Utah C11 ..... 4.15
Granite City,Ill. G4 ..... 4.25
Ind.Harbor,Ind. I-2, Y1 4.05
Kokomo,Ind. C16 ..... 4.15
Lackawanna,N.Y. B2 ..... 4.05
Mansfield,O. E6 (37) 4.05
Mansfield,O. E6 (38) 4.80
Munhall,Pa. U5 ..... 4.05
Newport,Ky. N9 ..... 4.05
Niles,O. N12 ..... 4.05
Pittsburg,Calif. C11 ..... 4.75
Pittsburgh J5 ..... 4.05
Portsmouth,O. P12 ..... 4.05
Riverdale,Ill. A1 ..... 4.05
Sharon,Pa. S3 ..... 4.05
So.Chicago,Ill. W14 ..... 4.05
SparrowsPoint,Md. B2 ..... 4.05
Steubenville,O. W10 ..... 4.05
Warren,O. R2 ..... 4.05
Weirton,W.Va. W6 ..... 4.05
Youngstown U5, Y1 ..... 4.05

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 ..... 5.35
Kokomo,Ind. C16 ..... 5.20
Niles,O. N12 ..... 4.95

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ..... 5.80
Youngstown Y1 ..... 5.80

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 ..... 6.10
Conshohocken,Pa. A3 ..... 6.15
Dravosburg,Pa. U5 ..... 6.10
Ecorse,Mich. G5 ..... 6.20
Fairfield,Ala. T2 ..... 6.10
FairlessHills,Pa. U5 ..... 6.15
Fontana,Calif. K1 ..... 6.875
Gary,Ind. U5 ..... 6.10
Ind.Harbor,Ind. I-2, Y1 6.10
Lackawanna(38) B2 ..... 6.10
Munhall,Pa. U5 ..... 6.10
Pittsburgh J5 ..... 6.10
Sharon,Pa. S3 ..... 6.10
So.Chicago,Ill. U5 ..... 6.10
SparrowsPoint(36) B2 .. 6.10
Warren,O. R2 ..... 6.10
Weirton,W.Va. W6 ..... 6.10
Youngstown U5, Y1 ..... 6.10

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..... 4.30
Cleveland R2 ..... 4.95
Ind.Harbor,Ind. I-2 ..... 4.30
Warren,O. R2 ..... 4.95

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport,Pa. P7 ..... 4.95
Cleveland J5, R2 ..... 4.95
Conshohocken,Pa. A3 ..... 5.00
Dravosburg,Pa. U5 ..... 4.95
Ecorse,Mich. G5 ..... 5.05
Fairfield,Ala. T2 ..... 4.95
FairlessHills,Pa. U5 ..... 5.00
Follansbee,W.Va. F4 ..... 4.95
Fontana,Calif. K1 ..... 5.05
Gary,Ind. U5 ..... 4.95
GraniteCity,Ill. G4 ..... 5.15
Ind.Harbor,Ind. I-2, Y1 4.95
Lackawanna,N.Y. B2 ..... 4.95
Middletown,O. A10 ..... 4.95
Newport,Ky. N9 ..... 4.95
Pittsburg,Calif. C11 ..... 5.90
Pittsburgh J5 ..... 4.95
Portsmouth,O. P12 ..... 4.95
SparrowsPoint,Md. B2 .. 4.95
Warren,O. R2 ..... 4.95
Weirton,W.Va. W6 ..... 4.95
Youngstown Y1 ..... 4.95

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 ..... 7.50
Dravosburg,Pa. U5 ..... 7.50
Ecorse,Mich. G5 ..... 7.60
FairlessHills,Pa. U5 ..... 7.55
Fontana,Calif. K1 ..... 8.55
Gary,Ind. U5 ..... 7.50
IndianaHarbor,Ind. Y1 .. 7.56
Lackawanna(37) B2 ..... 7.50
Pittsburgh J5 ..... 7.50
SparrowsPoint(38) B2 .. 7.50
Warren,O. R2 ..... 7.50
Weirton,W.Va. W6 ..... 7.50
Youngstown Y1 ..... 7.50

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 ..... 5.55
Middletown,O. A10 ..... 5.45
Warren,O. R2 ..... 5.55

SHEETS, Culvert (16 Gage)

	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.50	....
Canton,O. R2	6.80	7.10
Dravosburg,Pa. U5	5.70	....
Fairfield T2	5.70	....
Gary,Ind. U5	5.70	5.95
Ind.Harbor I-2	5.70	5.95
Kokomo,Ind. C16	5.80	....
MartinsFry.,O. W10	5.70	....
Newport,Ky. N9	5.70	5.95
Pitts.,Calif. C11	6.45	....
SparrowsPt. B2	5.70	....

SHEETS, Culvert—Pure Iron

Ashland,Ky A10 ..... 6.75
Gary,Ind. U5 ..... 5.95
MartinsFerry,O. W10 ..... 5.95

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2 ..... 5.45‡
Ashland,Ky A10 ..... 5.45*
Butler,Pa. A10 ..... 5.45†
Canton,O. R2 ..... 5.45‡
Delphos,O. N16 ..... 6.10‡
Dover,O. R1 ..... 5.45‡
Dravosburg,Pa. U5 ..... 5.45‡
Fairfield,Ala. T2 ..... 5.45†
Gary,Ind. U5 ..... 5.45*
GraniteCity,Ill. G4 ..... 5.65‡
Ind.Harbor,Ind. I-2 ..... 5.45‡
Kokomo,Ind. C16 ..... 5.55‡
MartinaFerry,O. W10 .. 5.45*
Middletown,O. A10 ..... 5.45†
Newport,Ky. N9 ..... 5.45‡
Niles,O. N12 ..... 5.45‡
Pittsburg,Calif. C11 .. 6.20*
SparrowsPt.,Md. B2 ..... 5.45‡
Weirton,W.Va. W6 ..... 5.45*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ..... 6.325

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg,Pa. U5 ..... 6.20
SparrowsPoint(30) B2 .. 6.20

SHEETS, Galvannealed Steel

Canton,O. R2 ..... 5.55
Dravosburg,Pa. U5 ..... 5.55
Kokomo,Ind. C16 ..... 6.20
Newport,Ky. N9 ..... 5.55
Niles,O. N12 ..... 5.55

SHEETS, Galvanized Ingot Iron

Ashland,Ky.(8) A10 ..... 5.70
Canton,O. R2 ..... 6.20

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland,Ky. A10 ..... 5.70
Butler,Pa. A10 ..... 5.70
Middletown,O. A10 ..... 5.70

SHEETS, Electrogalvanized

Cleveland(28) R2 ..... 6.30
Niles,O.(28) R2 ..... 6.30
Weirton,W.Va. W6 ..... 6.15

SHEETS, Aluminum Coated

Butler,Pa. A10 ..... 6.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ..... 5.375
Cleveland R2 ..... 5.375
Dravosburg,Pa. U5 ..... 5.375
Gary,Ind. U5 ..... 5.375
GraniteCity,Ill. G4 ..... 5.575
Ind.Harbor,Ind. I-2 ..... 5.375
Middletown,O. A10 ..... 5.375
Niles,O. N12 ..... 5.375
Youngstown Y1 ..... 5.375

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 .. 7.375
Follansbee(23) F4 ..... 6.60
Yorkville,O. W10 ..... 7.375

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va. W10 5.85
Gary,Ind. U5 ..... 5.85
Mansfield,O. E6 ..... 5.85
Middletown,O. A10 ..... 5.95
Niles,O. N12 ..... 5.85
Weirton,W.Va. W6 ..... 5.85

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ..... 6.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Co.
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div Buffalo-Eclipse Corp.
B13 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C31 Chester Blast Furnace Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E3 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman & Scott

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div.
N5 Nelson Steel & Wire Co.
N6 NewEng.High Carb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Nrthwest.Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P23 Pacific Steel Rolling

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons,John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Products
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.

T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R3	4.05
Allenport,Pa. P7	4.05
Alton,Ill. L1	4.225
Ashland,Ky.(8) A10	4.05
Atlanta A11	4.25
Bessemer,Ala. T2	4.05
Birmingham C15	4.05
Bridgeport,Conn. N19	4.35
Buffalo(27) R2	4.05
Conshohocken,Pa. A3	4.10
Detroit M1	4.15
Ecorse,Mich. G5	4.15
Fairfield,Ala. T2	4.05
Fontana,Calif. K1	4.825
Gary,Ind. U5	4.05
Ind.Harbor,Ind. I-2, Y1	4.05
Johnstown,Pa.(25) B2	4.05
Lackaw'na,N.Y.(25) B2	4.05
LosAngeles(25) B3	4.80
Milton,Pa. M16	4.05
Minnequa,Colo. C10	5.15
N.Tonawanda,N.Y. B11	4.05
Pittsburg,Calif. C11	4.80
Portsmouth,O. P12	4.05
Riverdale,Ill. A1	**4.05**
SanFrancisco S7	5.00
Seattle(25) B3, P23	5.05
Seattle N14	5.05
Sharon,Pa. S3	4.05
So.Chicago,Ill. W14	4.05
So.SanFrancisco(25) B3	4.80
SparrowsPoint,Md. B2	4.05
Sterling(1) N15	4.05
Sterling,Ill. N15	4.15
Torrance,Calif. C11	4.80
Warren,O. R2	4.05
Weirton,W.Va. W6	4.05
Youngstown U5	4.05

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.00
Carnegie,Pa. S18	6.70
Fontana,Calif. K1	8.10
Gary,Ind. U5	6.70
Ind.Harbor,Ind. Y1	6.70
LosAngeles B3	7.90
Newport,Ky. N9	6.70
Seattle P23	7.80
Sharon,Pa. S3	6.70
So.Chicago W14	6.70
Youngstown U5, Y1	6.70

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.15
Conshohocken,Pa. A3	6.15
Ecorse,Mich. G5	6.25
Fairfield,Ala. T2	6.15
Fontana,Calif. K1	7.25
Gary,Ind. U5	6.15
Houston S5	6.40
Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lackawanna,N.Y. B2	6.15
LosAngeles(25) B3	6.90
Seattle(25) B3, P23	7.15
Sharon,Pa. S3	6.15
So.SanFrancisco(25) B3	6.90
SparrowsPoint,Md. B2	6.15
Warren,O. R2	6.15
Weirton,W.Va. W6	6.15
Youngstown U5, Y1	6.15

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.30
Warren,O. R2	4.65

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	5.75
Baltimore T6	5.75
Boston T6	6.30
Cleveland A7, J5	5.75
Conshohocken,Pa. A3	5.80
Dearborn,Mich. D8	5.85
Detroit D2, M1, P20	5.85
Dover,O. G6	5.75
Ecorse,Mich. G5	5.85
Follansbee,W.Va. F4	5.75
Fontana,Calif. K1	7.50
FranklinPark,Ill. T6	5.85
Ind.Harbor,Ind. I-2	5.65
Ind.Harbor,Ind. Y1	5.75
Indianapolis C8	5.90
LosAngeles C1	7.80
Middletown,O. A10	5.75
NewBedford,Mass. R10, 6.20	
NewBritain(10) S15	5.75
NewCastle,Pa. B4, E5	5.75
NewHaven,Conn. A7	6.60
NewHaven,Conn. D2	6.20
NewKensington,Pa. A6	6.75
Pawtucket,R.I. R3	6.40
Pawtucket,R.I. N8	6.30
Pittsburgh J5	5.75
Portsmouth,O. P12	5.75
Riverdale,Ill. A1	5.85
Rome,N.Y.(32) R6	5.75
Sharon,Pa. S3	5.75
SparrowsPt.,Md. B2	5.75
Trenton,N.J.(31) R5	7.30
Wallingford,Conn. W2	6.30
Warren,O. B9, R2, T5	5.75
Weirton,W.Va. W6	5.75
Worcester,Mass. A7	6.60
Youngstown C8, Y1	5.75

STRIP, Cold-Rolled Alloy

Boston T6	12.80
Carnegie,Pa. S18	12.45
Cleveland A7	12.45
Dover,O. G6	12.45
Fontana,Calif. K1	14.55
FranklinPark,Ill. T6	12.45
Harrison,N.J. C18	12.45
Pawtucket,R.I. N8	**12.80**
Sharon,Pa. S3	12.45
Worcester,Mass. A7	12.75
Youngstown C8	12.90

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7, J5	8.60
Dearborn,Mich. D3	8.70
Dover,O. G6	8.60
Ecorse,Mich. G5	8.70
Ind.Harbor,Ind Y1	8.60
Lackawanna,N.Y. B2	8.425

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	5.75	8.35	9.30	11.45	14.15
Boston T6	6.30	8.35	9.30	11.45	14.15
Bristol,Conn. W1	...	...	9.30	11.45	...
Carnegie,Pa. S18	...	8.05	9.00	11.15	13.85
Cleveland A7	5.75	8.05	9.00	11.15	13.85
Cleveland C7	...	8.05	9.00	11.15	13.85
Dearborn,Mich. D3	5.85	8.25	9.20	...	...
Detroit D2	5.85	8.25	9.20	10.95	...
Dover,O. G6	5.85	8.05	9.00	11.15	13.85
FranklinPark,Ill. T6	5.85	8.05	9.00	11.15	13.85
Harrison,N.J. C18	...	...	9.30	11.45	14.15
Indianapolis C8	6.00	8.20	9.00	11.15	13.85
NewBritain,Conn.(10) S15	5.75	8.05	9.00	11.15	13.85
NewCastle,Pa. B4	5.75	8.05	9.00	11.15	...
NewCastle,Pa. E5	5.75	8.05	9.00	11.15	13.85
NewHaven,Conn. D2	6.20	8.35	9.30	11.25	...
NewKensington,Pa. A6	5.75	8.05	9.00	11.15	...
NewYork W3	...	8.35	9.30	11.45	14.15
Pawtucket,R.I. N8	6.30	8.35	9.30	11.45	14.15
Riverdale,Ill. A1	5.85	8.05	9.00	11.15	13.85
Rome,N.Y.(32) R6	5.75	8.05	9.00	10.95	13.25
Sharon,Pa. S3	5.75	8.05	9.00	11.15	13.85
Trenton,N.J. R5	...	8.35	9.30	11.45	14.15
Wallingford, Conn. W2	6.20	8.35	9.30	11.45	14.15
Warren,O. T5	5.75	8.05	9.00	11.15	13.85
Weirton,W.Va. W6	6.75	8.05	9.00	11.15	13.85
Worcester,Mass. A7, T6	6.60	8.35	9.30	11.45	14.15
Youngstown C8	5.85	8.05	9.00	11.15	13.85

Spring Steel (Tempered)

Bristol,Conn. W1	...	...	12.90	15.60	...
Buffalo W12	...	...	12.90	...	...
FranklinPark,Ill. T6	...	...	13.40	16.10	19.50
Harrison,N.J. C18	...	...	12.90	15.60	19.00
NewYork W3	...	...	12.90	15.60	19.00
Trenton,N.J. R5	...	...	12.90	15.60	19.00
Worcester,Mass. A7, T6	...	...	12.90	15.60	19.00
Worcester,Mass. W12	...	...	12.90	...	...
Youngstown C8	...	...	13.25	15.95	19.35

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	...	9.10	10.10	11.00
Brackenridge,Pa. A4	....	...	9.10	10.10	11.00
Mansfield,O. E6	8.025	8.50	9.10	10.10	11.00
Newport,Ky. N9	8.025	8.50	9.10	10.10	11.00
Niles,O. N12	8.025	8.50	9.10	10.10	....
Vandergrift,Pa. U8	....	8.50	9.10	10.10	11.00
Warren,O. R2	8.025	8.50	9.10	10.10	11.00
Zanesville,O. A10	....	8.50	9.10	10.10	11.00

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½¢ lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	...	9.85	10.85	11.75
GraniteCity,Ill. G4	8.425*	8.95*	9.55*	10.55*	....
IndianaHarbor,Ind. I-2	8.225	8.75*	9.35*	....	....
Vandergrift,Pa. U8	....	9.25†	9.85†	10.65†	11.75†
Vandergrift,Pa. U8	8.225*	8.75*	9.35*	10.35*	11.25*
Warren,O. R2	8.225†	9.25	9.85	10.85	11.75
Zanesville,O. A10	....	9.25	9.85	10.85	11.75

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	11.95	12.80	13.00	14.00
Brackenridge,Pa. A4	11.95	....	....	....
Newport,Ky. N9	11.95	....	....	....
Vandergrift,Pa. U8	11.95	12.50	13.00	14.00
Zanesville,O. A10	11.95‡	12.50‡	13.00‡	14.00‡

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.00	16.60	17.10	....
Butler,Pa. A10	....	....	16.60	17.10	....
Vandergrift,Pa. U8	14.00	15.00	16.60	17.10	12.70
Warren,O. R2	....	....	....	....	12.70‡

*Semiprocessed. †Fully processed only. ‡Coils annealed; semiprocessed ½¢ lower. §Coils, ¾-cent higher.

Pittsburgh J5	8.60
Sharon,Pa. S3	8.60
SparrowsPoint,Md. B2	8.425
Warren,O. R2	8.60
Weirton,W.Va. W6	8.60
Youngstown Y1	8.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	6.35

STRIP, Electrogalvanized

Cleveland A7	5.75*
Dover,O. G6	5.75*
Riverdale,Ill. A1	5.85*
Youngstown C8	5.75*
Warren,O. B9, T5	5.75*
Weirton,W.Va. W6	5.75*
Worcester,Mass. A7	6.60*

*Plus galvanizing extras.

Strip, Galvanized (Continuous)

Sharon,Pa. S3	6.15
Warren,O. B9	6.15

TIGHT COOPERAGE HOOP

Atlanta A11	4.775
Riverdale,Ill. A1	4.625
Sharon,Pa. S3	4.475
Youngstown U5	4.475

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.50	$7.75	$8.15
Dravosburg,Pa. U5	7.50	7.75	8.15
Fairfield,Ala. T2	7.60	7.85	8.25
FairlessHills,Pa. U5	7.60	7.85	8.25
Gary,Ind. U5	7.50	7.75	8.15
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.50	7.75	8.15
Niles,O. R2	7.50	7.75	8.15
Pittsburg,Calif. C11	8.25	8.50	8.90
SparrowsPoint,Md. B2	7.60	7.85	8.25
Weirton,W.Va. W6	7.50	7.75	8.15
Yorkville,O. W10	7.50	7.75	8.15

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.175	....	....
Niles,O. R2	6.175	6.375	6.575

TINPLATE,American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.80	$9.05
Dravosburg,Pa. U5	8.80	9.05
Fairfield,Ala. T2	8.90	9.15
Fairless,Pa. U5	8.90	9.15
Gary,Ind. U5	8.80	9.05
Ind.Har. I-2, Y1	8.80	9.05
Pitts.Cal. C11	9.55	9.80
Sp.Pt.,Md. B2	8.90	9.15
Warren,O. R2	8.80	9.05
Weirton,W.Va. W6	8.80	9.05
Yorkville,O. W10	8.80	9.05

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.60
Dravosburg,Pa. U5	6.60
Fairfield,Ala. T2	6.70
FairlessHills,Pa. U5	6.70
Gary,Ind. U5	6.60
GraniteCity,Ill. G4	6.70
Ind.Harbor,Ind. I-2, Y1	6.60
Niles,O. R2	6.60
Pittsburg,Calif. C11	7.35
SparrowsPoint,Md. B2	6.70
Warren,O. R2	6.60
Weirton,W.Va. W6	6.60
Yorkville,O. W10	6.60

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.20
Follansbee,W.Va. F4	6.20
Gary,Ind. U5	6.20
GraniteCity,Ill. G4	6.30
Ind.Harbor,Ind. Y1	6.20
Yorkville,O. W10	6.20

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$7.85
Gary,Ind. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$8.75

ROOFING SHORT TERNES (8 lb Coated)

Gary,Ind. U5	9.85

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	5.75
Aliquippa,Pa. J5	5.75
Alton,Ill. L1	5.925
Atlanta A11	5.95
Bartonville,Ill. K4	5.85
Buffalo W12	5.75
Chicago W13	5.75
Cleveland A7, C20	5.75
Crawfordsville,Ind. M8	5.85
Donora,Pa. A7	5.75
Duluth,Minn. A7	5.75
Fairfield,Ala. T2	5.75
Fostoria,O.(24) S1	5.95
Houston S5	6.00
Jacksonville,Fla. M8	6.27
Johnstown,Pa. B2	5.75
Joliet,Ill. A7	5.75
KansasCity,Mo. S5	6.00
Kokomo,Ind. C16	5.85
LosAngeles B3	6.70
Minnequa,Colo. C10	6.00
Monessen,Pa. P7	5.75
Newark 6-8 ga. I-1	6.40
No.Tonawanda B11	5.75
Palmer,Mass. W12	6.05
Pittsburg,Calif. C11	6.70
Portsmouth,O. P12	5.75
Rankin,Pa. A7	5.75
So.Chicago,Ill. R2	5.75
So.SanFrancisco C10	6.70
SparrowsPoint,Md. B2	5.85
Sterling,Ill.(1) N15	5.75
Sterling,Ill. N15	5.85
Struthers,O. Y1	5.75
Waukegan,Ill. A7	5.75
Worcester,Mass. A7	6.05

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.20
Alton,Ill. L1	7.375
Bartonville,Ill. K4	7.30
Buffalo W12	7.20
Cleveland A7	7.20
Donora,Pa. A7	7.20
Duluth,Minn. A7	7.20
Fostoria,O. S1	7.20
Johnstown,Pa. B2	7.20
LosAngeles B3	8.15
Milbury,Mass.(13) N6	7.50
Minnequa,Colo. C10	7.45
Monessen,Pa. P7, P16	7.20
Muncie,Ind. I-7	7.40
Palmer,Mass. W12	7.50
Pittsburg,Calif. C11	8.15
Portsmouth,O. P12	7.20
Roebling,N.J. R5	7.50
So.Chicago,Ill. R2	7.20
So.SanFrancisco C10	8.15
SparrowsPt.,Md. B2	7.30
Struthers,O. Y1	7.20
Trenton,N.J. A7	7.50
Waukegan,Ill. A7	7.20
Worcester A7,J4,T6,W12	7.50

WIRE, Upholstery Spring

Aliquippa,Pa. J5	6.90
Alton,Ill. L1	7.075
Buffalo W12	6.90
Cleveland A7	6.90
Donora,Pa. A7	6.90
Duluth,Minn. A7	6.90
Johnstown,Pa. B2	6.90
KansasCity,Mo. S5	7.50
LosAngeles B3	7.85
Minnequa,Colo. C10	7.075
Monessen,Pa. P7, P16	6.90
NewHaven,Conn. A7	7.20
Palmer,Mass. W12	7.20
Pittsburg,Calif. C11	7.85
Portsmouth,O. P12	6.90
Roebling,N.J. R5	7.20
So.Chicago,Ill. R2	6.90
So.SanFrancisco C10	7.85
SparrowsPoint,Md. B2	7.00
Struthers,O. Y1	6.90
Trenton,N.J. A7	7.20
Waukegan,Ill. A7	6.90
Worcester,Mass. A7	7.20

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	11.375
Bartonville,Ill. K4	11.30
Buffalo W12	11.30
Chicago W13	11.30
Cleveland A7	11.30
Crawfordsville,Ind. M8	11.30
Fostoria,O. S1	11.30
Jacksonville,Fla. M8	11.73
Johnstown,Pa. B2	11.30
Kokomo,Ind. C16	11.30
Minnequa,Colo. C10	10.95
Monessen,Pa. P16	11.20
Muncie,Ind. I-7	11.40
Palmer,Mass. W12	11.50
Roebling,N.J. R5	11.50
So.SanFrancisco C10	11.55
Waukegan,Ill. A7	11.20
Worcester,Mass. A7, T6	11.50

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4	9.90
Buffalo W12	9.90
Johnstown,Pa. B2	9.90
Minnequa,Colo. C10	10.025
Monessen,Pa. P16	9.90
Muncie,Ind. I-7	10.10
Portsmouth,O. P12	9.90
Roebling,N.J. R5	10.20
SparrowsPt.,Md. B2	10.00

ROPE WIRE	(A)
Alton,Ill. L1	9.75
Bartonville,Ill. K4	9.75
Buffalo W12	9.75
Fostoria,O. S1	9.75
Johnstown,Pa. B2	9.75
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
SparrowsPt. B2	9.85
Struthers,O. Y1	9.75
Worcester,Mass. T6	9.85
Worcester,Mass. J4	10.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead

Alton,Ill. L1	13.25
Bartonville,Ill. K4	13.25
Monessen,Pa. P16	13.15
Portsmouth,O. P12	13.15
Roebling,N.J. R5	13.45

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	7.95
Baltimore T6	8.25
Buffalo W12	7.95
Cleveland A7	7.95
Crawfordsville,Ind. M8	8.05
Dover,O. G6	7.95
Fostoria,O. S1	7.95
FranklinPark,Ill. T6	8.05
Kokomo,Ind. C16	8.05
Massillon,O. R8	7.95
Milwaukee C23	8.15
Monessen,Pa. P7, P16	7.95
Pawtucket,R.I. N8	8.25
Rome,N.Y.(32) R6	7.95
Trenton,N.J. R5	8.25
Worcester A7, T6, W12	8.25

WIRE, Merchant Quality (6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	6.90 7.30**
Aliquippa J5	6.90 7.425§
Atlanta A11	7.00 7.55
Bartonville(48) K4	7.00 7.575
Buffalo W12	6.90 7.30†
Cleveland A7	6.90 ....
Crawfordsville M8	7.00 7.55
Donora,Pa. A7	6.90 7.30†
Duluth,Minn. A7	6.90 7.30†
Fairfield T2	6.90 7.30†
Houston,Tex. S5	7.15 7.55†
Jacks'ville,Fla. M8	7.425 7.95
JohnstownB2(48)	6.90 7.45*
Joliet,Ill. A7	6.90 7.30†
KansasCity,Mo. S5	7.15 7.55†
Kokomo C16	7.00 7.40†
LosAngeles B3	7.85 ....
Minnequa C10	7.15 7.55**
Monessen P7 (48)	6.90 7.45
Palmer,Mass. W12	7.20 7.60†
Pitts.,Calif. C11	7.85-8.25†
Portsmouth,O. P12	6.90 ....
Rankin A7	6.90 7.30†
So.Chicago R2	6.90 7.30**
So.S.Fran. C10	7.85 8.25**
SparrwsPt.B2(48)	7.00 7.55*
Sterling(1)(48) N15	6.90 7.475
Struthers,O.(48) Y1	6.90 7.40†
Worcester,Mass A7	7.20 ....

*Based on 11c zinc; †5c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras.

WOVEN Fence, 9-15½ Ga.	Col.
Ala.City,Ala. R2	146**
Ala.City, 17 ga. R2	241**
Ala.City, 18 ga. R2	251**
Aliq'ppa,Pa.9-14½ga.J5	149‡
Atlanta A11	151
Bartonville,Ill. K4	151
Crawfordsville,Ind. M8	151
Donora,Pa. A7	146†
Duluth,Minn. A7	146†
Fairfield,Ala. T2	146†
Houston,Tex. S5	151†
Johnstown,Pa.(43) B2	149
Joliet,Ill. A7	146†
KansasCity,Mo. S5	151†
Kokomo,Ind. C16	148†
Minnequa,Colo. C10	151**
Monessen,Pa. 9 ga. P17	149
Pittsburg,Calif. C11	160†
Rankin,Pa. A7	146†
So.Chicago,Ill. R2	146**
Sterling,Ill.(1) N15	*150*

†Based on 5c zinc; *11c zinc; ‡10c zinc; **Subject to zinc equalization extras.

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	155
Atlanta A11	157
Bartonville,Ill. K4	157
Crawfordsville,Ind. M8	157
Donora,Pa. A7	155
Duluth,Minn. A7	155
Fairfield,Ala. T2	156
Joliet,Ill. A7	155
Houston S5	160
KansasCity,Mo. S5	160
Kokomo,Ind. C16	157
Minnequa,Colo. C10	160
Pittsburg,Calif. C11	179
So.Chicago,Ill. R2	155
So.SanFran.,Calif. C10	179
SparrowsPoint,Md. B2	157
Sterling,Ill.(1) N15	155

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	159**
Aliquippa J5	164‡
Atlanta A11	164
Bartonville,Ill. K4	*165*
Crawfordsville,Ind. M8	164
Donora,Pa. A7	159†
Duluth,Minn. A7	159†
Fairfield,Ala. T2	159†
Houston,Tex. S5	164†
Johnstown,Pa. B2	162*
Joliet,Ill. A7	159†
KansasCity,Mo. S5	164†
Kokomo,Ind. C16	161†
Minnequa,Colo. C10	164**
Monessen,Pa. P7	162
Pittsburg,Calif. C11	179†
Rankin,Pa. A7	159†
So.Chicago,Ill. R2	159**
So.SanFrancisco C10	179**
SparrowsPoint,Md. B2	164*
Sterling,Ill.(1) N15	*163*

†Based on 5c zinc; *11c zinc; ‡10c zinc; **Subject to zinc equalization extras.

WIRE (16 Gage)	An'ld Stone	Galv. Stone
Ala.City R2	13.15	14.70**
Bartonville K4	13.25	15.10
Buffalo W12	13.15	....
Cleveland A7	13.15	....
Crawfrdsville M8	13.25	15.10
Fostoria,O. S1	13.25	14.80†
Johnstown B2	13.15	15.00*
Kokomo C16	13.25	14.80†
Minnequa C10	13.40	15.10**
Palmer,Mas.W12	13.15	14.70†
Pitts.,Calif. C11	13.50	15.05†
So.Chicago R2	13.15	14.70
SparrowsPt. B2	13.25	15.10*
Sterling(1) N15	13.15	15.05
Waukegan A7	13.15	14.70†
Worcester A7	13.45	....

*Based on 11c zinc; †5c zinc; ‡10c zinc; **Subject to zinc equalization extras.

NAILS, Stock To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	137
Aliquippa,Pa. J5	137
Atlanta A11	139
Bartonville,Ill. K4	139
Chicago,Ill. W13	137
Cleveland A9	142
Crawfordsville,Ind. M8	139
Donora,Pa. A7	137
Duluth,Minn. A7	137
Fairfield,Ala. T2	137
Galveston,Tex. D7	145
Houston,Tex. S5	142
Johnstown,Pa. B2	137
Joliet,Ill. A7	137
KansasCity,Mo. S5	142
Kokomo,Ind. C16	139
Minnequa,Colo. C10	142
Monessen,Pa. P7	137
Pittsburg,Calif. C11	156
Rankin,Pa. A7	137
So.Chicago,Ill. R2	137
SparrowsPt.,Md. B2	139
Sterling,Ill.(1) N15	137
Worcester,Mass. A7	143

NAILS, CUT (100 lb keg) To Dealers (33)	
Conshohocken,Pa. A3	$8.30
Wheeling,W.Va. W10	8.30

STAPLES, Polished Stock To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	138
Atlanta A11	140
Bartonville,Ill. K4	139
Crawfordsville,Ind. M8	139
Donora,Pa. A7	138
Duluth,Minn. A7	138
Fairfield,Ala. T2	138
Johnstown,Pa. B2	138
Joliet,Ill. A7	138
Kokomo,Ind. C16	139
Minnequa,Colo. C10	142
Monessen,Pa. P7	137
Pittsburg,Calif. C11	157
Rankin,Pa. A7	138
Sparrows Pt., Md. B2	140
Sterling,Ill.(1) N15	138
Worcester,Mass. A7	144

TIE WIRE, Automatic Baler (14½ Ga.) Per 97 lb Net Box)

Coil No. 3150

Donora,Pa. A7	$8.77
Duluth,Minn. A7	8.77
Joliet,Ill. A7	8.77

Coil No. 6500 Stand.

Donora,Pa. A7	$9.05
Duluth,Minn. A7	9.05
Joliet,Ill. A7	9.05

Coil No. 6500 Interim

Donora,Pa. A7	$9.10
Duluth,Minn. A7	9.10
Joliet,Ill. A7	9.10

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(Base discounts, per cent off list, f.o.b. midwestern plants)

4 in. and shorter:	
½-in. & smaller diam	2
Over 4 in. through 6 in.:	
½ in. & smaller diam	+3
6 in. and shorter:	
⅞-in. and ⅝-in.	+4
¾-in. and larger	+6
Longer than 6 in.:	
All diameters	+15
Lag bolts, all diams:	
6 in. and shorter	6
Over 6 in. long	+2
Ribbed Necked Carriage	+4
Blank	10
Plow	23
Step, Elevator, Tap and Sleigh Shoe	10
Tire Bolts	+3
Boiler & Fitting-Up Bolts	21

NUTS

H.P. and C.P., regular & heavy:	
Square, all sizes	55
H.P., Hex. regular & heavy:	
⅝" and smaller	55
⅞" to 1⅛", inclusive.	58
1⅛" to 1½", inclusive	60
1⅝" and larger	55
C.P. Hex regular & heavy:	
All sizes	55
Hot Galv. Nuts (all types):	
⅝" or smaller	38
⅞" to 1⅛", inclusive.	41
Finished Hex Nuts:	
New standard, all sizes	55
Semifinished & Slotted Hex:	
Regular and heavy, all sizes	55

SQUARE HEAD SET SCREWS

(1035 steel; packaged; per cent off list)

1 in diam x 6 in. and shorter	34
1 in. and smaller diam x over 6 in.	20

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller	34
¼ in. diam & larger	14
N.F. thread, all diams.	8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish	43
Plated finishes	23

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:	
¼-in. through ⅝-in.	38
⅝-in. through 1 in.	15
Longer than 6 in.:	
⅜-in. through ⅝-in.	20
⅝-in. through 1 in.	7

RIVETS

F.o.b. Cleveland, and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 9.25

⅞-in. under..List less 37%

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..... List

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	19.59	19.00
1¼	13	....	23.21	18.77
1½	13	21.40	25.65	20.75
1⅝	13	25.28	30.31	24.52
2	13	33.33	33.97	27.48
2¼	13	31.91	38.26	30.95
2⅜	12	34.63	41.52	33.59
2½	12	38.15	45.74	37.00
2¾	12	41.31	49.53	40.07
3	12	44.05	52.82	42.72

RAILWAY MATERIALS

RAILS	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.45	4.35	4.40	5.35
Ensley,Ala. T2	4.45	4.35	...	5.35
Fairfield,Ala. T2	...	...	...	5.35
Gary,Ind. U5	4.45	4.35	4.40	...
IndianaHarbor,Ind. I-2	4.45	4.35	4.40	...
Johnstown,Pa. B2	...	...	...	(16)5.35
Lackawanna,N.Y. B2	4.45	4.35	...	5.35
Minnequa,Colo. C10	4.45	4.35	...	5.85
Steelton,Pa. B2	4.45	4.35	...	5.35
Williamsport,Pa. S10	...	...	...	5.35

TIE PLATES	
Fairfield,Ala. T2	5.275
Gary,Ind. U5	5.275
Ind.Harbor,Ind. I-2	5.275
Lackawanna,N.Y. B2	5.275
Minnequa,Colo. C10	5.275
Seattle B3	5.425
Steelton,Pa. B2	5.275
Torrance,Calif. C11	5.425

TRACK BOLTS (20) Treated	
Cleveland R2	11.50
KansasCity,Mo. S5	11.50
Lebanon,Pa. B2	11.50
Minnequa,Colo. C10	11.50
Pittsburgh O3, P14	11.50
Seattle B3	12.00

AXLES	
Ind.Harbor,Ind. S13	6.75
Johnstown,Pa. B2	6.75

JOINT BARS	
Bessemer,Pa. U5	5.425
Fairfield,Ala. T2	5.425
Ind.Harbor,Ind. I-2	5.425
Joliet,Ill. U5	5.425
Lackawanna,N.Y. B2	5.425
Minnequa,Colo. C10	5.425
Steelton,Pa. B2	5.425

SCREW SPIKES	
Cleveland R2	11.00

STANDARD TRACK SPIKES	
Fairfield,Ala. T2	7.30
Ind.Harbor,Ind. I-2, Y1	7.30
KansasCity,Mo. S5	7.30
Lebanon,Pa. B2	7.30
Minnequa,Colo. C10	7.30
Pittsburgh J5	7.30
Seattle B2	7.80
So.Chicago,Ill. R2	7.30
Struthers,O. Y1	7.30
Youngstown R2	7.30

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge iron:	Cents
98+% Fe, annealed	15.25
Unannealed:	
Minus 100 mesh	11.75
Minus 35 mesh	9.25
Minus 20 mesh	9.00
Swedish, c.l.f. N.Y., c.l., in bags	11.25
Domestic (Swedish), f.o.b. Riverton, N. J., in bags	9.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.91% Fe, irregular fragments of ⅛ in. x 1.3 in.	21.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	32.50
Unannealed (99+% Fe) (minus 325 mesh)	52.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron: 97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Atomized, 500 lb drums, frght. allowed:	
Carlots	32.20
Ton lots	34.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	31.25-39.75†
Bronze, 5000-lb lots	51.50-54.75†
Copper:	
Electrolytic	13.75*
Reduced	13.75*
Lead	7.50*
Manganese:	
Minus 35 mesh	61.00
Minus 100 mesh	67.00
Minus 200 mesh	72.00
Nickel, unannealed	97.00
Nickel-Silver, 5000-lb lots	47.50-51.00
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	43.50
Solder	7.00*
Stainless Steel, 302	94.00
Stainless Steel, 316	81.25
Tin	14.50*
Zinc, 5000-lb lots	17.25-31.00‡
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.95
Less than 1000 lb	5.10
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 30% Zn, 10% Ni; **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛" to 1 7/16"; 1 7/16" to 1 15/16" 4.75c; 1 15/16" to 7 5/16" 5.15c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga. 36" wide.
(24) Deduct 0.10c, finer than 16 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 4.95c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c for carbon, add 0.60c for alloy and 0.35c, H.S.-L.A.
(31) Widths over ⅝-in.; 6.40c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 5.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.025" and heavier, 0.20c higher.
(41) 9 lbs for cut lengths.
(42) Mill lengths, f.o.b. mill; dedd. to mill zone or within switching limits, 0.10c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	27c		35.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.69		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv.*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5
Ambridge, Pa. N2	13.5	..	17.5	...	20	...	21.5	...	21.5	...	20.75	...	23.25	...
Lorain, O. N3	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5
Youngstown Y1	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	13.5	+3	17.5	+0.25	20	2.25	21.5	3.75	21.5	3.75	20.75	3	23.25	5.5

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		8c		8c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Alton, Ill. L1	...	...	....	....	....	....	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Benwood, W. Va. W10	24	+4.5	15.25	+10.25	7.25	+17.25	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Butler, Pa. F8	25	+3.5	17	+8.5	9.5	+15	....	..	....	...	....	..	....	....
Etna, Pa. N2	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Fairless Hills, Pa. N3	...	...	....	....	....	....	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Fontana, Calif. K1	...	...	....	....	....	....	10.75	+6.5	13.75	+2.5	16.25	1	18.75	2.25
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	22.75	5.5	25.75	9.5	28.25	13	30.75	14.25
Lorain, O. N3	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Sharon, Pa. S4	25	+3.5	17	+8.5	9.5	+15	....	..	....	...	....	..	....	....
Sharon, Pa. M6	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Sparrows Pt., Md. B2	23	+5.5	15	+10.5	7.5	+17	21.75	4.5	24.75	8.5	27.25	12	29.75	13.25
Youngstown R3, Y1	...	...	....	....	....	....	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25
Wheatland, Pa. W9	23	+5.5	15	+10.5	7.5	+17	23.75	6.5	26.75	10.5	29.25	14	31.75	15.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	32.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Alton, Ill. L1	30.25	14.25	30.75	14.75	32.25	15	32.25	15	....	...	....	...
Benwood, W. Va. W10	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Etna, Pa. N2	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Fairless Hills, Pa. N3	30.25	14.25	30.75	14.75	32.25	15	32.25	15	23.5	5.75	23.5	5.75
Fontana, Calif. K1	19.25	3.25	19.75	3.75	21.25	4	21.25	4	12.5	+5.25	12.5	+5.25
Ind. Harbor, Ind. Y1	31.25	15.25	31.75	15.75	33.25	16	33.25	16	24.5	6.75	25.5	6.75
Lorain, O. N3	32.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Sharon, Pa. M6	32.25	16.25	32.75	16.75	34.25	17	34.25	17	....	...	....	...
Sparrows Pt., Md. B2	30.25	14.25	30.75	14.75	32.25	15	32.25	15	23.5	5.75	23.5	5.75
Youngstown R3, Y1	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75
Wheatland, Pa. W9	32.25	16.25	32.75	16.75	34.25	17	34.25	17	25.5	7.75	25.5	7.75

*Galvanized pipe discounts based on current price of zinc (12.00c; East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	Shapes; H.R. & C.F. H.R. Strip	Bars; Wire	Plates	Sheets	C.R. Strip; Flat	Wire
301	16.75	21.00	30.00	34.75	30.25	35.75	37.75	41.75	38.75	
302	17.75	23.25	30.25	35.00	32.50	36.00	38.00	42.00	42.00	
302B	19.00	25.00	31.00	35.00	35.50	36.00	38.00	45.25	45.25	
303	....	25.25	32.75	37.75	....	38.75	40.25	46.00	46.00	
304	19.00	24.50	31.75	36.75	35.00	38.00	40.50	44.50	44.50	
304L	....	....	36.75	41.75	40.00	43.00	45.50	49.50	49.50	
305	20.50	26.50	33.50	37.25	38.00	38.00	41.00	47.50	47.50	
308	20.75	27.25	36.25	41.75	39.00	43.00	47.00	49.00	49.00	
309	27.75	36.00	44.00	50.50	50.50	51.75	55.00	63.25	63.25	
309S	29.75	38.75	48.00	55.75	55.25	58.75	60.25	69.75	69.75	
310	35.00	45.25	58.75	68.25	64.75	69.50	71.00	74.25	74.25	
314	....	....	....	....	....	....	71.00	....	....	
316	29.75	38.00	48.25	56.25	55.00	57.25	60.50	64.50	64.50	
316L	....	....	53.25	61.25	60.00	62.25	65.50	69.50	69.50	
317	35.00	45.50	59.25	68.75	69.50	70.25	72.75	79.00	79.00	
321	23.50	30.25	36.50	41.50	41.75	42.75	46.50	51.25	51.25	
330	....	....	....	61.50	....	....	72.00	72.25	81.25	81.25
18-8CbTa	29.25	38.25	48.00	53.25	53.00	53.75	56.50	66.50	66.50	
403	....	....	....	27.00	30.75	....	32.00	34.25	....	....
405	16.50	21.75	25.25	29.25	30.50	30.25	31.75	39.75	39.75	
410	14.00	18.25	24.00	27.25	26.25	28.75	30.00	34.25	34.25	
414	....	....	....	24.50	....	....	29.25	30.50	35.25	35.25
416	....	....	....	24.50	26.25	....	29.25	....	....	....
420	22.00	28.50	29.25	34.00	35.50	35.00	38.50	52.75	52.75	
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	34.75	34.75	
430F	....	....	....	25.00	28.75	....	29.75	....	....	....
431	15.00	19.25	25.00	28.75	28.00	29.75	31.00	35.75	35.75	
446	....	....	....	33.50	38.25	50.25	39.50	40.75	59.75	59.75

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%
Stainless:			
302	....	....	28.00
304	28.30	33.60	29.75
304-L	30.30	35.50	....
310	41.30	47.00	....
316	33.40	38.80	42.75
316-L	37.80	43.30	....
316-CB	38.90	45.50	....
321	30.00	35.30	34.25
347	32.20	38.60	44.25
405	23.90	31.10	....
410	23.40	30.60	....
430	23.40	30.60	24.25
Inconel	47.90	63.90	....
Nickel	39.50	54.10	....
Monel	40.80	54.80	....
L-Nickel	41.70	58.50	....
Copper*	....	....	46.00

	Strip, Carbon Base—Cold-Rolled 10%	Strip, Carbon Base—Cold-Rolled Both Sides
Copper*	26.00	32.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.26	5% Cr Hot Work	0.405
Extra Carbon	0.31-.315	W-Cr Hot Work	0.425
Special Carbon	0.37	V-Cr Hot Work	0.445
Oil Hardening	0.405	Hi-Carbon-Cr	0.73

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.030
18.25	4.25	1	4.75	...	2.245-2.415
18	4	2	9	...	2.615
18	4	2	....	...	1.705
18	4	1	....	...	1.560
14	4	2	5	...	2.185
13.75	3.75	2	5	...	2.185
13.5	4	3	....	...	1.805
9	3.5	..	....	...	1.115
6	4	2	....	5	1.045
6	4	3	....	6	1.290
1.5	4	1	....	8.5	0.900

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	52.38	52.88	....	....
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	56.50†	....
Gadsden,Ala. R2	52.38	52.88	....	....
Cincinnati, deld.	....	60.58	....	....
Buffalo District				
Buffalo H1, R2	56.00	56.50	57.00	57.50
Tonawanda,N.Y. W12	56.00	56.50	57.00	....
No.Tonawanda,N.Y. T9	....	56.50	57.00	57.50
Boston, deld.	66.65	67.15	67.65	....
Rochester,N.Y., deld.	59.02	59.52	60.02	....
Syracuse,N.Y., deld.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Chicago R2	56.00	....	56.50	....
Gary,Ind. U5	56.00	....	56.50	....
IndianaHarbor,Ind. I-2	56.00	....	56.50	....
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	....
So.Chicago,Ill. U5	56.00	....	56.50	57.00
Milwaukee, deld.	58.17	58.67	58.67	59.17
Muskegon,Mich., deld.	....	62.80	62.80	....
Cleveland District				
Cleveland A7, R2	56.00	56.50	56.50	57.00
Akron,O., deld.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem,Pa. B2	58.00	58.50	59.00	59.50
NewYork, deld.	....	62.28	62.78	....
Newark, deld.	61.02	61.52	62.02	62.52
Birdsboro,Pa. B10	58.00	58.50	....	....
Chester,Pa. C31	....	48.50	49.00	....
Philadelphia, deld.	....	50.16	50.66	....
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Philadelphia, deld.	59.66	60.16	60.66	61.16
Troy,N.Y. R2	58.00	58.50	59.00	59.50
Pittsburgh District				
NevilleIsland,Pa. P6	56.00	56.50	56.50	57.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	57.87	57.87	58.37
McKeesRocks, deld.	....	57.54	57.54	58.04
Lawrenceville,Homstead, Wilmerding,Monaca, deld.	....	58.16	58.16	58.66
Verona,Trafford, deld.	58.19	58.69	58.69	59.19
Brackenridge, deld.	58.45	58.95	58.95	59.45
Bessemer,Pa. U5	56.00	....	56.50	57.00
Clairton,Rankin,So.Duquesne,Pa. U5	56.00	....	....	....
McKeesport,Pa. N2	56.00	....	....	57.00
Midland,Pa. C18	56.00	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	56.50	....
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield,O., deld.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	60.50	61.00	61.50	....
Fontana,Calif. K1	62.00	62.50	....	....
Geneva,Utah C11	56.00	56.50	....	....
GraniteCity,Ill. G4	57.90	58.40	58.90	....
Ironton,Utah C11	56.00	56.50	....	....
LoneStar,Texas L6	52.00	52.50*	52.50	....
Minnequa,Colo. C10	58.00	59.00	59.00	....
Rockwood,Tenn. T2	....	52.50*	56.50	....
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, deld.	61.76	62.26	....	....

*Low phos, southern grade. †Phos, 0.30 max.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.
Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$65.00
Buffalo H1	66.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50 Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$80.50
Keokuk,Iowa. (Open-hearth & Fdry, freight allowed K2)	85.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	88.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland A7 (Intermediate)	$61.00
Lyles,Tenn. T3	70.00
Rockwood,Tenn. T2	70.00
Steelton,Pa. B2	64.00
Philadelphia, deld.	67.55
Troy,N.Y. R2	64.00

Warehouse Steel Products

Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except Birmingham and St. Paul, 15 cents; Philadelphia, New York, Boston and Los Angeles, 10 cents; Buffalo, 25 cents on C.R. and galvanized sheets, C.F. and alloy bars and 20 cents on other commodities; Houston, Seattle, Spokane, Wash., no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Galv. 10 Ga.†	Stainless Type 302††	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††‡		Carbon	Floor
Baltimore	6.02	7.51	7.79	....	6.69	...	6.68	8.02[4]	12.54	6.72	6.37	7.76
Birmingham	6.35	7.35	8.25[2]	....	6.60	...	6.50	9.10	....	6.65	6.65	8.45
Boston	7.23	8.23	9.52	45.28[9]	7.47	...	7.20	8.60	12.30	7.49	7.37	8.50
Buffalo	6.35	7.40	8.79	....	6.70	...	6.50	7.40	12.00	6.72	6.65	7.90
Charlotte, N. C.	6.95	7.80	8.69	....	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.38	7.38	8.30	46.05	6.62	...	6.51	7.25	11.75	6.69	6.52	7.64
Cincinnati	6.49	7.37	8.30	46.10	6.86	...	6.75	7.50	12.00	6.86	6.81	7.89
Cleveland	6.38	7.38	8.25	46.16	6.72	...	6.57	7.35	11.81	7.02	6.69	7.81
Detroit	6.57	7.57	8.58	43.50	6.90	7.36	6.79	7.54	11.95	7.16	6.80	7.83
Erie, Pa.	6.35	7.38	8.30	....	6.70	...	6.50	7.45[4]	....	6.69	6.52	7.64
Houston	7.35	7.80	9.93	....	7.70	9.30	7.70	9.30	....	7.60	7.35	8.75
Los Angeles	7.50	9.35	9.95	50.15	7.85	11.75	7.45	10.15	13.15	7.65	7.45	9.55
Milwaukee	6.47	7.47	8.39	....	6.71	...	6.60	7.44	11.84	6.86	6.61	7.73
Moline, Ill.	6.73	7.73	8.65	....	6.97	...	6.86	7.60	....	7.04	6.87	...
New York	6.97	7.91	8.79	44.95	7.56	...	7.37	8.73[4]	12.13	7.38	7.27	8.68
Norfolk, Va.	7.00	....	....	....	7.10	...	7.10	8.60	....	7.10	7.10	7.95
Philadelphia	6.19	7.44	8.26	41.98[9]	6.96	8.80	6.74	7.86[4]	11.96	6.54	6.49	7.51**
Pittsburgh	6.38	7.38	8.30	46.00	6.72	...	6.51	7.35	11.75	6.69	6.52	7.64
Portland, Oreg.	7.00	7.75	8.90	48.50	7.25	...	7.05	10.20	14.00	7.00	6.85	8.75
Richmond, Va.	6.43	7.39	8.67	....	6.77	...	6.71	8.33	....	7.08	6.65	8.08
St. Louis	6.67	7.67	8.59	43.89	6.91	...	6.80	7.64[4]	12.04	7.09	6.81	7.93
St. Paul	7.04	8.04	8.96	....	7.28	...	7.17	8.01	....	7.35	7.18	8.30
San Francisco	7.55	8.95	9.40	51.65	7.80	...	7.35	10.05	13.05	7.50	7.40	9.15
Seattle	8.10	9.80	10.15	51.00	8.20	...	7.80	10.95	13.50	7.75	7.80	9.60
Spokane	8.35	9.65[2]	10.05	....	7.80	...	7.80	10.85[5]‖	14.25	7.45	7.55	9.60
Washington	6.70	7.99	7.97	....	7.37	...	7.38	9.09	....	7.31	7.05	8.16

*Prices do not include gage extras; †prices include gage and coating extras, based on 12-cent zinc except in New York, Philadelphia, Los Angeles, Cincinnati, Cleveland, Pittsburgh, San Francisco (12-cent zinc) and in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **⅛-in. and heavier; ††as annealed; ‡‡prices include $2 for crating; ‖under ⅛-in.

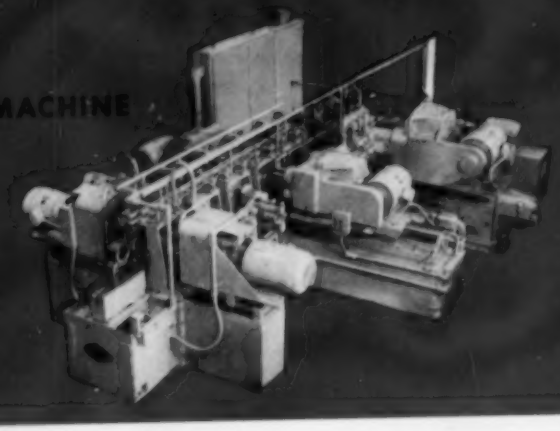
Base quantities, 2000 to 4999 lb except as noted: Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb; stainless sheets, 8000 lb except in New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [2]—500 to 9999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over.

10 Station Automatic In-Line TRANSFER MACHINE

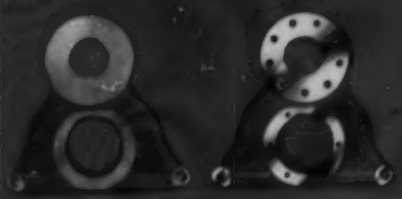
BAKER

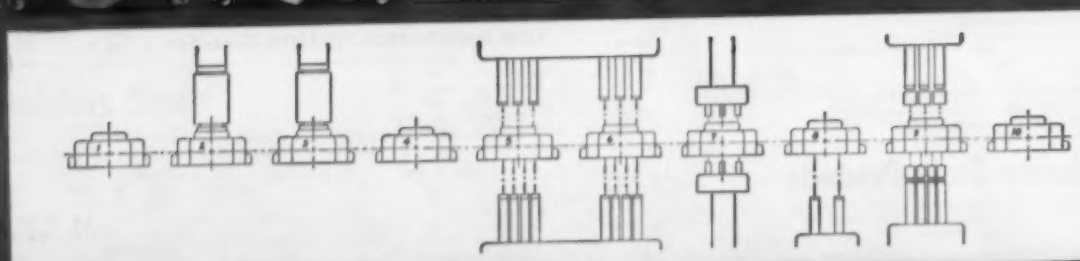
Performs Multiple Operations on Tractor Housings

THE MACHINE



THE PART





THE OPERATIONS

STATION NO. 1
LOAD 1 PART

STATION NO. 2
UNIT NO. 1
COMB. SEMI. FIN. BORE 5.165 & 3.249 & 2.861 DIAS.
COMB. SEMI. FIN. BORE 4.425 THRU BOTH WALLS

STATION NO. 3
UNIT NO. 1
COMB. FIN. BORE 5.180 & 3.264 & 2.876 DIAS.
COMB. FIN. BORE 4.440 THRU BOTH WALLS

STATION NO. 4
IDLE

STATION NO. 5
UNIT NO. 2 "U" DRILL 5 HOLES
31/64 DRILL 6 HOLES

UNIT NO. 3 31/64 DRILL 8 HOLES
21/32 DRILL 1 HOLE
"U" DRILL 6 HOLES
23/32 DRILL 1 HOLE

STATION NO. 6
UNIT NO. 2 ½ CHAMFER 5 HOLES
⅝ CHAMFER 6 HOLES

UNIT NO. 3 ⅝ CHAMFER 7 HOLES
13/16 CHAMFER 1 HOLE
½ CHAMFER 6 HOLES
23/32 DRILL 1 HOLE
COMB. COUNTERBORE
.796 & CHAMFER 1 HOLE

STATION NO. 7
INSPECTION

STATION NO. 8
UNIT NO. 4
.6910 REAM 1 HOLE
.8157 COUNTERBORE 1 HOLE

STATION NO. 9
UNIT NO. 5 7/16-14 N.C. TAP 5 HOLES
9/16-12 N.C. TAP 6 HOLES

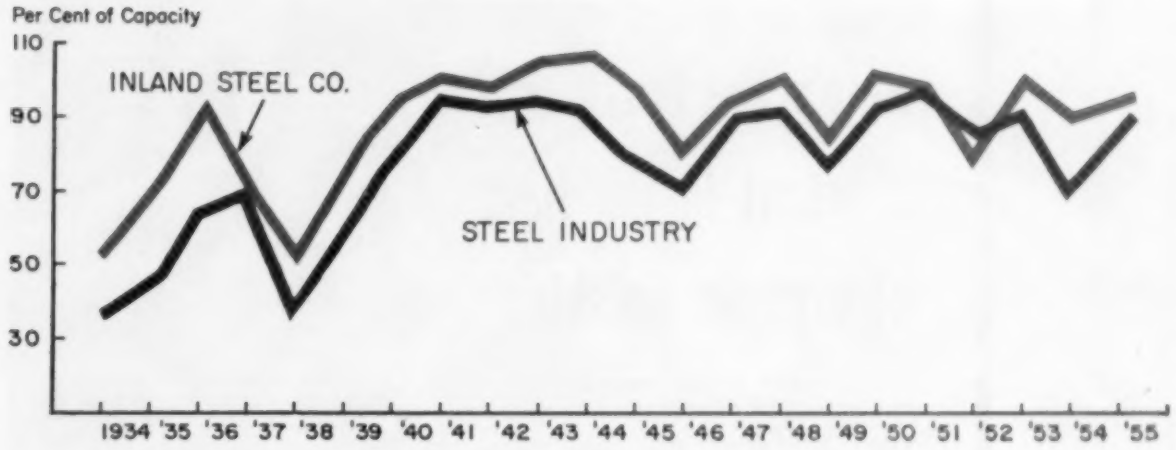
UNIT NO. 6 7/16-14 N.C. TAP 6 HOLES
9/16-12 N.C. TAP 7 HOLES
½-14 N.P.T. TAP 2 HOLES

STATION NO. 10
UNLOAD 1 PART

Whatever Your Specific Job Problem, Consult Baker Engineers. Write

BAKER BROTHERS, INC., TOLEDO, OHIO

Annual Steel Production Rates



Business Is Always Good at Inland Steel

LOOK at the chart. In all except one of the last 21 years, Inland Steel Co.'s annual steel ingot production rate has exceeded the national average. And it has been 5 to 17 points above the national average each week thus far this year.

The year that Inland was below the national average—1952—was one of a long strike by steelworkers.

An Early Start—Inland's above-average operations have not been limited to the years in the chart. The company's annual report shows that the 62-year-old company operated at 95 per cent in 1904 when the industry was at 55 per cent. Ten and 20 years later it was still out-performing the industry. Its average rate in 1914 was 77.9 per cent, compared with the industry's average of 59.2 per cent. At the end of the next decade—1924—it was operating at 85.9 per cent, when the industry was at 63.8 per cent.

While the steel industry as a whole saw operations sag in 1954, Inland set a new ingot production record. It poured 4,522,257 net tons. Its previous record was 4,513,076 net tons in 1953.

In Growing Market—Why does Inland's rate of production stand head and shoulders above the industry's average? One reason, Inland will tell you, is the excellent teamwork within its organization. A more unique explanation is the geographical location of its plants and sales area.

Inland's plants are in Chicago-area cities—Indiana Harbor, Ind., and Chicago Heights, Ill. Its main office is in Chicago. Sales offices are in Chicago, Davenport, Iowa, Detroit, Indianapolis, Kansas City, Mo., Milwaukee, New York, St. Louis and St. Paul.

Deficit Area—The Chicago region often is referred to as a deficit area in steel production: Consumption exceeds production. One of the reasons for this is the persistent move westward of the country's population, and with it, the center of metalworking. The geographical center of metalworking is in Marion county, Ohio. The geographical center of steelmaking is in Allen county, Ohio (see STEEL, Jan. 10, p. 38).

Population keeps a jump ahead of the steel plants. The East North Central region in which Inland is situated (Illinois, Indiana, Ohio, Michigan and Wisconsin) uses over half of all steel produced in this country (see STEEL, Jan. 17, p. 125 and Jan. 24, p. 113).

Move-up—Expansion of steel consumption in the Midwest has prompted Inland to boost its capacity—it moved up from eighth to seventh place as a steelmaker at the beginning of 1955 when a 300,000-ton increase raised its capacity to 5 million tons. The company now has 4 per cent of the nation's steelmaking capacity.

For the second consecutive year, Inland hoisted its ingot capacity without building additional open-hearth furnaces. The increase came from enlargement of existing furnaces, together with improved furnace design, the use of heavier and more efficient materials handling equipment and the development of better operating techniques, including greater use of oxygen.

Setting a Record—In the last six years, the company has lifted its capacity 1.6 million tons, and expects its capital expenditures this year to be $40 million, highest annual amount in its history. Last year its capital expenditures were $30 million.

Inland continues to plan for growth and development. It has a good reason for doing so. Increasingly you hear estimates that this country's steelmaking capacity will have to be 200 million tons by 1975. Today, it has 125.8 million tons.

If an expanding population has anything to do with it, we will need more steel capacity. The nation's population is growing at the rate of one person every 12 seconds. That's 7200 persons—a small town—in 24 hours. It's equivalent, says the U. S. Department of Commerce, to a Richmond, Va., each month, a Maryland each year and a California every four years.

Steel Bars . . .

Bar Prices, Page 152

The spring bulge in consumers' requirements is boosting barmakers' order backlogs noticeably. Still, the pressure for shipments is nothing to compare with that for sheets. Pittsburgh mills report auto builders and related suppliers are taking a large percentage of total shipments, with appliance makers and warehouses ordering somewhat larger volume than they did a short time ago. In the

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East, volume is described as good, but no great consuming pressure, either on the mills or warehouses, is in evidence. In fact, some May books of producers only recently became filled, and there still is some rolling time available for that delivery position. As a general thing, however, most barmakers are booked into June. Prospects are promising for active demand for at least the next two months.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 153 & 154

While more demand for cold-rolled and galvanized sheets is coming out for third quarter than the mills are willing to accept, consumer pressure appears less strong than it was a few weeks back.

Buyers seem less disposed to order too far ahead, especially when they are uncertain what prices will prevail at time of shipment. Generally, incoming orders are expected to peak next month and begin to decline in June, reflecting some slackening in automotive and appliance needs.

Most consumers expect steel wages will rise around midyear, followed by an advance in prices early in July. In only limited degree is it possible for buyers to beat a July price rise by stockpiling. Tonnage for second-quarter shipment, over and above regular needs, is almost impossible to obtain.

Buying for forward delivery is governed primarily by anticipated needs, plus a reasonable build-up. This latter is reflected in lengthening deliveries on hot-rolled sheets, which still are available for shipment in the current quarter.

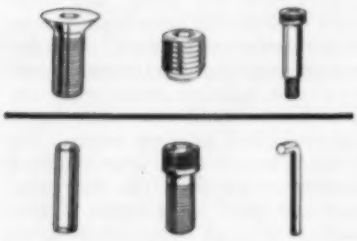
For the most part, the strength of current sheet demand is difficult to gage. Midwestern mills are booked solid through the second quarter on cold-rolled, wide hot-rolled, galvanized and enameling. Carryover tonnage from second to third quarter is certain to exceed by a wide margin that carried over from first to second quarter. Cold-rolled sheets promise to continue in tight supply well into the third quarter.

Republic Steel Corp. has issued a revised extra list on galvanized sheets and formed roofing, effective Apr. 8. Changes largely apply to galvanized sheets in coil form. They will be available from Republic's new continuous galvanizing line at Warren, O., this quarter.

The corporation's 98-in., continuous, hot-strip mill at Cleveland set an all-time record in March when it rolled 163,730 tons.

A new firm, Scottdale Steel Corp., plans to operate a rolling mill at

UNBRAKO AT WORK



BUTTONING UP THE JOB PROPERLY. UNBRAKO Button Head Socket Screws, of course, provide a smooth, streamlined surface. They are strong, too. But equally important is the ease with which they can be inserted and withdrawn without marring the socket of the screw or the surface of the assembly. For the complete UNBRAKO story, see your authorized industrial distributor. Or write to STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

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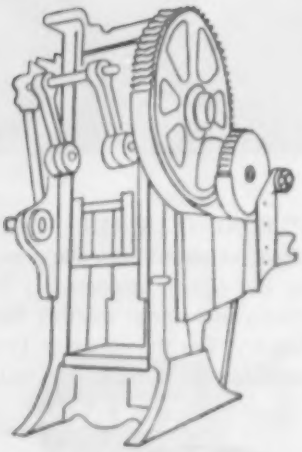

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Scottdale, Pa. It will convert hot-rolled coils to cold-finished sheet and strip, 2 to 18 in. in width.

Steel Output Soars in March

March was the third highest steel production month in history. The nation's steelmaking furnaces poured 9,979,000 net tons during the month, reports the American Iron & Steel Institute. That figure was exceeded only in two months of 1953—March and May—with 10,168,098 and 9,997,080 tons, respectively.

Output in the first quarter this year amounted to 27,313,670 net tons, the largest production in any three-month period since the third quarter of 1953. The total for the first quarter of 1954 was 22,324,323 tons.

In March, the index of steel production (1947-49 equals 100) was 140.3, compared with 132.2 in February and 102.5 in March of last year. The index for the first quarter was 132.2, against 108.1 in the like period of 1954.

March production was equal to 93.3 per cent of capacity operations, while that for first quarter was equal to 88 per cent of current capacity of 125,828,310 net tons.

Plates . . .

Plate Prices, Page 153

Expanding requirements for construction and fabrication of heavy equipment are slowing down plate deliveries.

Purchases of heavy plates for electrical equipment at Pittsburgh are estimated to be 30 per cent above predictions made last December. Demand is almost double that of last summer.

Supply of heavy plates is slightly tighter than it is in light plates. Deliveries at Pittsburgh range up to 12 weeks, with producers booked through early June on both the light and heavy classifications. At least one eastern mill still can take orders for sheared plate for June shipment. In general, producers' schedules are fairly well filled for second quarter.

Tank work is a feature of the current market. Oil storage needs are swelling plate volume. Chemical requirements are brisk, and boiler work is providing more tonnage than it did some weeks back. In addition to structural requirements, maritime and railroad needs show improvement. Line pipe plate needs are prominent at some points. The bulge is largely from large-diameter, electric-welded pipe. In New England and other areas where pipeline tonnage is small, improvement in the market stems largely from tank and structural fabricators.

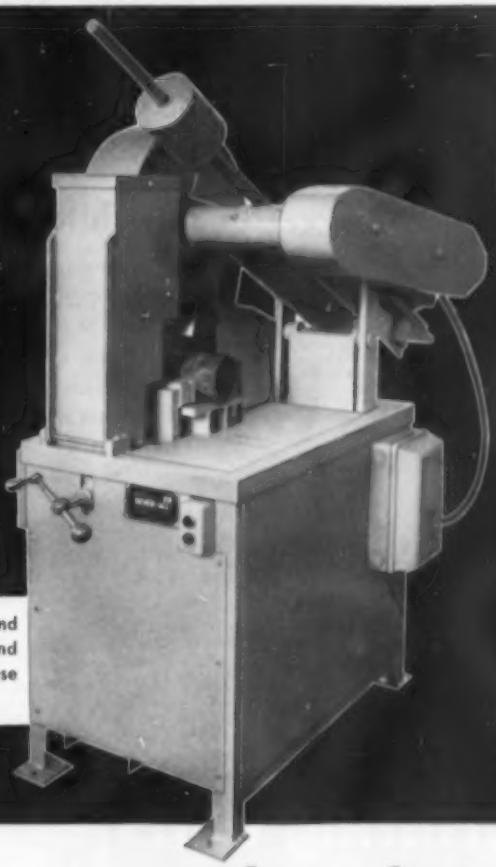
Campbell Abrasive Cutter

an ACCO product

New Model 28 Campbell Sever-All Dry Cutter

- Compact
- Portable
- Ideal for contract or construction work

CAPACITY: Solids up to 4" x 4" square, angles and channels to 8", tubes and pipes to 4" O.D., 4" angles and channels and 4" O.D. pipe at 45° angles. Based on use of 18" cutting wheel and 10 H.P. motor.



Here's a versatile cutter you can take to the job

• This new CAMPBELL Model 28 SEVER-ALL Abrasive Cutter is a dry-cutting machine which combines the capacity for a wide variety of cutting operations with a compactness which permits a portability seldom found in cutters of its type and capacity. It is ideal for cutting all types of material in contract or construction work. Can be supplied with work stop and with wheels for easy movement from job to job.

From front to back, the SEVER-ALL measures but 56". It is only 32" wide and 62" in height. Other important features include:

1. Work clamped on both sides of cut by hand-operated, self-centering work holders. Can be supplied with foot-operated treadle.

2. Time of cut is approximately 3 seconds per square inch of material.

3. Operator safety provided by complete enclosure of cutting wheel during operation—except for openings to clear the work.

4. Lowering of guard permits accurate location of work, permits long pieces to be placed in machine without threading through.

This Model 28 SEVER-ALL cutter is the newest of a long line of CAMPBELL Abrasive Cutters which provide many exclusive features. CAMPBELL field engineers are conveniently located to consult with you on ALL your cutting problems. Write today for specifications on the SEVER-ALL or **Bulletin DH-301** on the CAMPBELL Abrasive Cutting Method.

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Spiegeleisen: (19-21% Mn, 1-3% Si), Carlot per gross ton $86, Palmerton, Pa.; $87 Clairton and Duquesne, Pa.
(16 to 19% Mn) $84 per ton, Palmerton, Pa.; $85 per ton, Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.). Base price per net ton $190, Clairton, Duquesne, Johnstown and Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, Philo, O.; Sheffield, Ala.; Portland, Oreg., and Tacoma, Wash. Add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%) Lump $198 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 76%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 29.95c per lb of contained Mn, carload packed 30.7c, ton lots 31.8c, less ton 33c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max. 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max). Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lot 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carloads, 30c; 2000 lb to min carloads, 32c; 250 lb to 1999 lb 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-85%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.00c per lb of alloy, carload packed 11.75c, ton lots 12.65c, less ton 13.65c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 35-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 24.75c per lb of contained Cr; c.l. packed 25.65c, ton lot 26.80c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload lump, bulk, C 0.025% max. (Simplex 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c, 2% C 32.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.15c, ton 28.50c, less ton 30.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, S M x D, 18.35c per lb of alloy; ton lot 19.2c; less ton lot, 20.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 24.75c per lb of contained chromium plus 12c per pound of contained silicon; 1" x down, bulk 24.90c per pound of contained chromium plus 12.2c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min 97% Cr and 1% Fe). Contract, 1" x D; packed, max 0.50%, carload $1.16, ton lots $1.18; less ton $1.20. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 9c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 25-55%, Si 8-12% max, C 3-3.5% max). Contract, any quantity, $3.00 per lb of contained V. Delivered, Spot, add 10c. **Crucible-Special Grades** (V 50-55%, Si 2-3.5% max, C 0.5-1% max) $3.10. **Primos and High Speed Grades** (V 50-55%, Si 1.50% max C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12c per lb of contained Si, carload packed 13.6c, ton lot 15.5c, less ton 16.7c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.7c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per pound contained silicon; carload packed 14.85c; ton lots, 16.05c; less ton, 17.4c, delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.4c per lb of contained Si, carload packed 15.7c, ton lot 16.85c, less ton 18.1c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 17.25c per lb of contained Si, carload packed 18.45c, ton lot 19.4c, less ton 20.45c. Delivered. Spot, add 0.25c.

Silicon Metal: (Mn 97% Si and 1% max Fe). C.l. lump, bulk, regular 15.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.5c for max. 0.10% calcium grade. Deduct 0.5c for max 2% Fe grade analyzing min 96% Si. Spot, add 0.25c.

Alsifer. (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.25c per lb of alloy, ton lots packed 10.15c, 200 to 1999 lb 10.50c, smaller lots 11c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.5c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 25.25c per lb of alloy, ton lot 26c, less ton 27.25c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Boresil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Borium: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carborium: (B 1 to 2%) Contract, lump, carloads 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3% lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.05c per lb of briquet, carload packed 16.95c, ton 17.75c, less ton 18.65c. Deld. Add 0.25c for notching, Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 11.85c per lb of briquet, c.l. packaged 12.85c, ton lot 13.85c, less ton 14.55c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ⅝ lb of Si). Contract, c.l. bulk 12.45c per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.55c per lb of briquet, Packed c.l. 7.55c, ton lot 8.35c, less ton 9.25c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.7c. Packaged c.l. 7.7c, ton lot 8.5c, less ton 9.4c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.80 per lb of contained W; 2000 lb W to 5000 lb W, $3.90; less than 2000 lb W, $4.02, f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $12 per lb of contained Cb, less ton $12.05. Delivered. Spot, add 10c.

Ferrotitanium—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $6.25 per lb of contained Cb plus Ta., deld.; less ton lots $6.30.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carloads packed 1" x D, 45c pel lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%), C.l. packed, 17.50c per lb of alloy, ton lots 18.50c; less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-S Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 16.6c per lb of alloy; ton lots 18.10c; less ton lots 19.35c, f.o.b. Niagara Falls; freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 15.50c. Packed c.l. 16.50c, 2000 lb to c.l. 16.75c, less than 2000 lb 17.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.46 in all sizes except powdered which is $1.57; Washington, Pa., furnace, any quantity, $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa., $1.25 in cans; in bags, $1.24, f.o.b. Langeloth, Pa.; Washington Pa., $1.24.

Wire . . .

Wire Prices, Pages 154 & 155

While manufacturers wire is moving well, business in merchant items is not coming up to seasonal expectations. Demand for wire specialties is reported improving. Requirements for wire rope railing for highways are mounting, for both new installations and replacements. Webster & Webster Inc., East Hartford, Conn., recently booked a $147,399 contract for reconstruction of railing in Connecticut.

Furniture and other spring wire volume is up in New England, with May schedules filling and some orders on mill books for June shipment. Mechanical spring buying has edged up to a nationwide basis of about 125,000 tons annually. Little hedge buying against a possible price increase around midyear is noted.

Tin Plate . . .

Tin Plate Prices, Page 154

Can shipments in February were 262,127 tons, 6 per cent below the January total but slightly ahead of volume in February, 1954, when 260,199 tons were moved. Cumulative total for January-February was 541,769 tons, compared with 524,950 in the like period of 1954.

Cans for fruit and vegetable packing, including juice, during the first two months totaled 127,807 tons, against 116,308 in the like-1954 period. Coffee requirements dropped sharply, 31,575 tons against 41,770. Beer cans totaled 78,831 tons in the period, against 67,898 in the first two months of last year. Cans for nonfood products amounted to 72,891 tons, against 80,244.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 152

Seasonal pickup in building and construction is stimulating demand for reinforcing bars. Last year the mills shipped 1,750,957 tons of concrete bars, and they expect to better that figure this year. Highway construction and public building assure active demand over the coming months.

Second quarter inquiries for bars are 10 to 15 per cent better than at this time a year ago in the Los Angeles area. Other West Coast points, such as San Francisco and Seattle, report marked gains in ordering over the last several weeks. Reports from other market centers over the country are similarly optimistic. Competition continues keen.

Tubular Goods . . .

Tubular Goods Prices, Page 156

Orders for tubular goods are coming to the mills in good volume, notably for seamless tubes for oil-country use. Demand for seamless and welded tubes is substantial, but it is not large enough to provide order backlogs of more than a few weeks. Buyers are seeking rapid deliveries.

In New England, merchant pipe supply is tightening moderately, following a sustained period of reasonably prompt shipments.

Pipe is more freely available than most other finished steel products, but deliveries on seamless, notably 5 to 10 in., extend into June. Most New England demand is for May and June. On 12 in. and over, some mills are booking orders for July shipment.

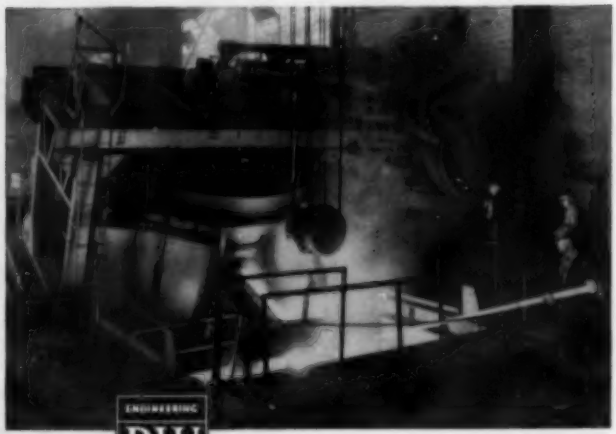
Mechanical tubing shipments extend to six weeks. Stainless tubing deliveries also are more extended than they were.

Seasonal upswing in demand for cast iron pipe continues. Considerable tonnage is pending for early placement. One of the largest recent awards on the West Coast involved 1154 tons of 6-to-12-in. pipe for Yakima, Wash. The tonnage went to the Pacific States Cast Iron Pipe Co.

When Stainless is the answer, but you can't see the cost, try...

IngAclad

STAINLESS-CLAD STEEL



If the cost of solid stainless is holding you back, IngAclad may well be the answer to your problem! IngAclad *stainless-clad* steel saves you money two ways: costs less than solid stainless, easier to fabricate.

Yet it gives you the same advantages—protective qualities, corrosion resistance, strength, beauty. Standard cladding 20% stainless, 80% carbon steel.

Why not see for yourself! Write, wire or phone for details.

Ingersoll STEEL DIVISION

ENGINEERING B-W PRODUCTION

Borg-Warner Corporation

310 S. Michigan Ave., Chicago 4, Ill.

Plant: New Castle, Indiana

Warehouse . . .

Warehouse Prices, Page 157

Distributors are experiencing better business this month than in March, which was the best of the year to date. The pickup in demand encompasses the full range of products and is especially strong in sheets, shapes, plates and bars—in that order.

Demand is more active for alloys and is steady for stainless. Bulk of bookings in stainless flat-rolled products is for nickel-bearing grades; about 25 per cent of bar sales are straight chromium.

Purchases reflect mainly an actual gain in consumption, although partly due to lagging mill shipments. Consumers are more dependent on warehouses to fill gaps for needed flat-rolled items. Orders are for normal warehouse quantities in most instances. In cold-rolled and the wider hot-rolled sheets, quantities booked must be restricted frequently, so that distributors can serve the largest number of customers and maintain a working inventory.

Rails, Cars . . .

Track Material Prices, Page 155

New York, New Haven & Hartford Railroad placed 20,000 tons of 78-ft rails with the U. S. Steel Corp., Pittsburgh, and Bethlehem Steel Co., Bethlehem, Pa. Because of nonstandard length, rail ends will be prepared for welding to the desired 78 ft.

The Railways Ministry of India will buy about 24,000 freight cars and 774 locomotives this year, reports *Foreign Commerce Weekly*. Half the cars and 170 locomotives will be built in India and the remaining equipment will be purchased in foreign countries, partly under the U. S. aid program.

Semifinished Steel . . .

Semifinished Prices, Page 152

A bulge in steel ingot operations by the Northeastern Steel Corp., Bridgeport, Conn., is due partly to exportation of billets. One cargo of 1100 tons recently left Bridgeport, the first export shipment to leave that port direct in many years.

More steel is reaching Connecticut by water. Two strip converters are taking hot-strip shipments from Baltimore through New Haven, Conn. Water shipments to Portland, Me., from Baltimore are frequent.

India closes bids Apr. 25 on 2000 long tons of spring-steel billets.

A leading steel producer in the San Francisco district reports March was its best order month since September, 1952.

Ores

Lake Superior Iron Ore

(Prices effective for the 1955 shipping season; gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$10.40
Old range nonbessemer	10.25
Mesabi bessemer	10.25
Mesabi nonbessemer	10.10
Open-hearth lump	11.25
High phosphorus	10.00

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)	24.00-26.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$25.00-$26.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, 85c-87c per long ton unit c.i.f. U. S. ports, duty for buyer's account; 46-47%, 75c-80c.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $40.00-$42.00
48% 3:1	42.00-44.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	31.00-32.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.80

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

56-60%	$3.25-$3.80
65%	4.15-4.25

Vanadium Ore

Cents per lb, V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Pueblo, Colo., $94; Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Farral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $114; Salina, Pa., $119; Niles, O., $125; Los Angeles, Pittsburg, Calif., $137.20.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $120; Warren, Niles, O., Hays, Pa., $125; Morrisville, Pa., $123.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $130; Cutler, Utah, $121.55; Los Angeles, $127.85.

Super Duty: Hays, Sproul, Pa., Warren, Windham, O., Athens, Tex., $137; Morrisville, Pa., Niles, O., $140; Joliet, Ill., $143.

Semisilica Brick (per 1000)

Clearfield, Pa. $130; Philadelphia, $116; Woodbridge, N. J., $114.

Insulating Fire Brick (per 1000)

2300° *F:* Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $206; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick (per 1000)

Dry Pressed: Bessemer, Ala., $64.60; Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Mo., $77.50; Wellsville, O., $81.50; Clearfield, Pa., Portsmouth, O., $87; Peria, Ark., $100; Los Angeles $110.25; Pittsburg, Calif., $111.30.

High-Alumina Brick (per 1000)

50 *Per Cent:* Clearfield, Pa., St. Louis, Mexico, Mo., $181; Danville, Ill., $189.50.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Clearfield, Pa., $225; Danville, Ill., $213.30.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $260; Danville, Ill., $258; Clearfield, Pa., $267.

Sleeves (per 1000)

Recedale, Johnstown, Bridgeburg, Pa., $147; Clearfield, Pa., $148.50; St. Louis, $159.30; Athens, Tex., $155.

Nozzles (per 1000)

Recedale, Pa., $234.70; Johnstown, Pa., $240.70; Clearfield, Pa., $241.40; St. Louis, $259.45; Athens, Tex., $247.70; Bridgeburg, Pa., $287.50.

Runners (per 1000)

Recedale, Johnstown, Bridgeburg, Pa., $183.50; Clearfield, Pa., $185.50; St. Louis, $195.80; Athens, Tex., $191.80.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Nario, Gibsonburg, Woodville, O., $14.50; Thornton, McCook, Ill., $15.10; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite (per net ton)

Domestic, dead-burned bulk, ¾-in. grains with fines: Luning, Nev., Chewelah, Wash., $38.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.50-$14.00
Connellsville, foundry	16.50-17.00

Oven Foundry Coke

Kearny, N. J., ovens	$24.50
Camden, N. J., ovens	24.00
Everett, Mass., ovens	*26.05
New England, deld.	24.50
Chicago, ovens	26.00
Chicago, deld.	24.05
Terre Haute, Ind., ovens	25.25
Milwaukee, ovens	24.25
Indianapolis, ovens	24.85
Cincinnati, deld.	25.50
Painesville, O., ovens	27.43
Cleveland, deld.	25.00
Erie, Pa., ovens	22.65
Birmingham, ovens	27.58
Cincinnati, deld.	25.00
Buffalo, ovens	26.25
Buffalo, deld.	18.50
Lone Star, Tex., ovens	24.00
Philadelphia, ovens	24.00
Swedeland, Pa., ovens	
St. Louis, ovens	26.00
St. Louis, deld.	23.75
St. Paul, ovens	24.00
Portsmouth, O., ovens	26.62
Cincinnati, O., deld.	25.50
Detroit, ovens	26.50
Detroit, deld.	27.06
Pontiac, deld.	28.58
Saginaw, deld.	

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzol	36.00
Toluol, one deg.	32.00-35.00
Industrial xylol	32.00-35.00

Per ton, bulk, ovens

Sulphate of ammonia	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol, 40 deg. (U.S.P.), tank cars	18.00
c.l. drums	19.00
l.c.l. drums	19.50

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $35-$36; 70%, $32-$33; 60%, $28-$29. Imported, net tons, duty paid, metallurgical grade: European, $28-$30; Mexican, $25.50.

Electrodes

Threaded with nipple, unbored, f.o.b. plant

Diam (Inches)	Length	Per 100 lb
GRAPHITE		
2	24	$47.75
2½	30	30.75
3	40	30.00
4	40	28.50
5½	40	28.25
6	60	25.50
7	60	25.25
8, 9, 10	60	22.75
12	72	26.00
14	60	22.50
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17	60	22.00
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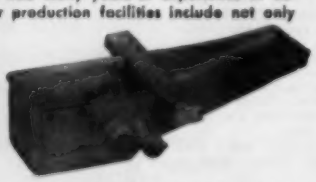

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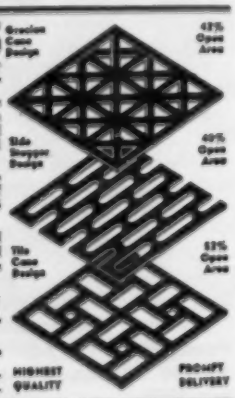

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Scrap . . .

Scrap Prices, Page 170

Philadelphia—Scrap prices are unchanged with a slightly stronger undertone in evidence. More material is coming out, but there appears to be sufficient demand, both domestic and foreign, to keep the market in balance.

New York—Brokers have advanced buying prices on No. 1 cupola to a range of $32-$33; on heavy breakable to $33-$34. Prices on all other grades are unchanged, including the major steel classifications and stainless.

Buffalo — Scrap is marking time here after sales a week ago that established the market on a lower basis. Large reserve stocks in millyards are offsetting the high ingot rate.

Boston—Steel scrap prices are off slightly in New England, both heavy melting and the lighter grades. Export prices are holding, but less tonnage is arriving at dock. No. 2 steel is soft, with buying light.

Cincinnati—No new orders for scrap are reported in this market, indicating, at least for the present, that mill inventories are in good shape. Prices are firm and unchanged.

Chicago—The scrap market holds essentially unchanged, with price changes few and relatively minor. The low volume of dealer scrap being purchased appears incongruous with steel ingot output, which, for two weeks hand running, has established an all-time high. Mills hold good scrap inventories and are using more than normal ratios of hot metal.

Pittsburgh—Mill inventories are sizable. Scrap movement has slowed, and the market is showing signs of weakness. There have been no major purchases in the past week. Prices are unchanged.

Cleveland—Except for one substantial purchase of electric furnace grades by a Valley mill, the scrap market was devoid of important activity last week. The Valley purchase was at $38, delivered, confirming the price in effect for some weeks. With mill buying restricted, the undertone of the market in general is weaker. This, however, is not being reflected in prices, which are holding unchanged.

St. Louis—The price line was broken on scrap last week when Keystone Steel & Wire Co., Peoria, Ill., bought a large tonnage of several grades at two prices—one applicable on the St. Louis base, the other on the Chicago base. No. 2 steel, for example, was $32.50 on the former, $34 on the latter. Shipments to the district are substantial. Mill stocks are well above 60 days.

Los Angeles—Steelmaking grades of scrap are weaker, with only token tonnages moving. Prices are mixed. Some business is being done below posted quotations.

San Francisco—Demand for cast grades of scrap is rising seasonally. The improvement, however, is not reflected in prices. Steel grades of scrap are moving sluggishly.

Seattle — The scrap market is steady, following the recent $2 increase in prices.

Washington — Consumption and stocks of ferrous materials (scrap and pig iron) decreased in February, reports the Bureau of Mines. Scrap stocks totaled 6,394,000 gross tons, down 2 per cent from January, while pig iron stocks at 2,128,000 tons were off 3 per cent from the preceding month.

Pig Iron . . .

Pig Iron Prices, Page 157

Demand for pig iron is strong, with the probability that April consumption will equal that of March.

Producers and sellers are watching for indications concerning May business. These are likely to come first from the automotive industry which is the largest user of gray iron.

Ship More Steel in February

Shipments of finished steel products in February totaled 6,119,900 net tons. It's highest monthly figure since October, 1953, reports the American Iron & Steel Institute. The total was nearly 110,000 tons above the 6,009,958 tons shipped in January.

All major product categories gained except sheets and strip, which was slightly under the previous month. But sheets and strip remained the top tonnage group, with shipments totaling 2,455,746 net tons, or 40.2 per cent of the over-all total.

The automotive industry continued the largest market classification, accounting for 1,508,037 net tons, or 25.9 per cent of total domestic shipments in the month. The next largest tonnage, 1,078,701 tons, went to warehouses and distributors.

Iron Ore . . .

Iron Ore Prices, Page 167

U. S. mines and mills produced 2,786,973 gross tons of iron ore and shipped 1,586,963 tons during January, reports the Bureau of Mines. These totals were both 9 per cent below January 1954, and were the

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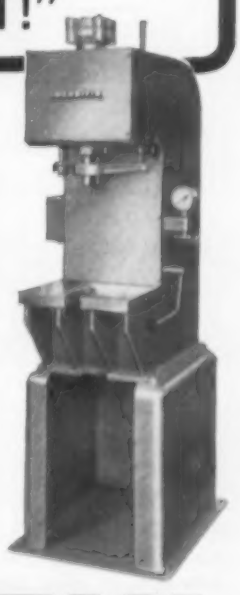

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Apr. 13	$37.41
Apr. 6	37.41
Mar. Avg.	37.50
Apr. 1954	25.67
Apr. 1950	29.40

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer's plant)

No. 1 heavy melting..	38.00-39.00
No. 2 heavy melting..	34.00-35.00
No. 1 bundles	38.00-39.00
No. 2 bundles	29.00-30.00
No. 1 busheling	38.00-39.00
Machine shop turnings.	22.00-23.00
Mixed borings, turnings	22.00-23.00
Short shovel turnings..	26.00-27.00
Cast iron borings	26.00-27.00
Cut structurals, 5 ft lengths	41.00-42.00
Heavy turnings	35.00-36.00
Punchings & plate scrap	41.00-42.00
Electric furnace bundles	39.00-40.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	33.00-34.00
Heavy breakable cast..	33.00-34.00
Unstripped motor blocks	22.00-23.00
No. 1 machinery cast..	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt.	41.00-42.00
Rails, 2 ft and under..	51.00-52.00
Rails, 18 in. and under.	52.00-53.00
Rails, random lengths.	47.00-48.00
Railroad specialties	44.50-45.50

Stainless Steel Scrap

18-8 bundles & solids.	210.00-220.00
18-8 turnings	105.00-110.00
430 bundles & solids	95.00-100.00
430 turnings	60.00-65.00

CLEVELAND

(Delivered consumer plant)

No. 1 heavy melting...	34.00-36.00
No. 2 heavy melting...	31.00-32.00
No. 1 bundles	34.00-36.00
No. 2 bundles	28.00-29.00
No. 1 busheling	34.00-36.00
Machine shop turnings.	17.00-18.00
Mixed borings, turnings	24.00-25.00
Short shovel turnings..	24.00-25.00
Cast iron borings	24.00-25.00
Low phos.	34.00-36.00
Cut structural plate 2 ft and under	41.50-42.00
Alloy free, short shovel turnings	26.50-27.50
Electric furnace bundles	34.00-36.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Charging box cast	37.00-38.00
Stove plate	40.00-42.00
Heavy breakable cast..	34.00-35.00
Unstripped motor blocks	29.00-30.00
Brake shoes	32.00-33.00
Clean auto cast	46.00-47.00
No. 1 wheels	43.00-44.00
Burnt cast	33.00-34.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
R.R. malleable	45.00-46.00
Rails, 2-ft and under..	50.00-51.00
Rails, 18-in. and under.	51.00-52.00
Rails, random lengths.	45.00-46.00
Cast steel	39.00-40.00
Railroad specialties	39.00-40.00
Uncut tires	41.00-42.00
Angles, splice bars	46.00-47.00
Rails, rerolling	52.00-53.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	190.00-200.00
18-8 turnings	80.00-90.00
430 clips, bundles, solids	80.00
430 turnings	40.00-50.00

YOUNGSTOWN

(Delivered consumer plant)

No. 1 heavy melting...	37.00-38.00
No. 2 heavy melting...	32.00-33.00
No. 1 bundles	37.00-38.00
No. 2 bundles	27.50-28.50
No. 1 busheling	37.00-38.00
Machine shop turnings.	18.00-19.00
Short shovel turnings..	25.00-26.00
Cast iron borings	25.00-26.00
Low phos.	37.00-38.00
Electric furnace bundles	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00

CHICAGO

No. 1 heavy melting..	35.00-37.00
No. 2 heavy melting	*33.00-34.00*
No. 1 factory bundles..	37.00-38.00
No. 1 dealer bundles	*36.00-37.00*
No. 2 bundles	24.00-25.00
No. 1 busheling	35.00-37.00
Machine shop turnings.	18.00-19.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings..	20.00-21.00
Cast iron borings	20.00-21.00
Cut structurals, 3 ft	37.00-38.00
Punchings & plate scrap	38.00-39.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	36.00-37.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
R.R. malleable	45.00-46.00
Rails, 2-ft and under..	50.00-51.00
Rails, 18-in. and under.	51.00-52.00
Angles, splice bars	44.00-45.00
Rails, rerolling	52.00-53.00

Stainless Steel Scrap

18-8 bundles & solids	220.00-225.00
18-8 turnings	95.00-100.00
430 bundles & solids	105.00-110.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting...	29.50
No. 2 heavy melting...	23.00
No. 1 bundles	29.50
No. 2 bundles	22.00
No. 1 busheling	29.00
Machine shop turnings.	13.00
Mixed borings, turnings	13.00
Short shovel turnings..	17.50
Punchings & plate scrap	34.00

Cast Iron Grades

Charging box cast	28.00
No. 1 cupola	37.00
Stove plate	32.00
Heavy breakable	28.00
Unstripped motor blocks	20.00
Clean auto cast	42.00
Malleable	35.00

BIRMINGHAM

No. 1 heavy melting...	32.00-33.00
No. 2 heavy melting...	27.00-28.00
No. 1 bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Cast iron borings	17.00-18.00
Short shovel turnings..	25.00-26.00
Machine shop turnings.	18.00-19.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	45.00-46.00
Stove plate	42.00-43.00
Bar crops and plate	36.00-37.00
Structural plate, 2 ft	36.00-37.00
Unstripped motor blocks	35.50-36.50

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-37.00
Rails, 18 in. and under	43.50-44.50
Rails, rerolling	43.00-44.00
Rails, random lengths.	39.00-40.00
Angles, splice bars	40.00-41.00
Stand. steel axles	35.00-36.00

PHILADELPHIA

(Delivered consumers' plant)

No. 1 heavy melting..	37.50-38.00
No. 2 heavy melting..	34.00
No. 1 bundles	37.50-38.00
No. 2 bundles	30.00
No. 1 busheling	37.50-38.00
Electric furnace bundles	40.00
Machine shop turnings	22.50
Mixed borings, turnings	22.00
Short shovel turnings.	25.00
Structurals & plate...	41.00-42.00
Heavy turnings	34.00-35.00
Couplers, springs, wheels	42.50
Rail crops, 2 ft & under	52.00-53.00

Cast Iron Grades

No. 1 cupola	38.00
Malleable	44.00
Heavy breakable cast..	41.00
Drop broken machinery	44.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting..	32.00-32.50
No. 2 heavy melting..	28.00-28.50
No. 1 bundles	32.00-32.50
No. 2 bundles	24.00-25.00
Machine shop turnings.	12.00-13.00
Mixed borings, short turnings	14.00-15.00
Short shovel turnings..	15.00-16.00
Low phos. (structural & plate)	34.00-35.00

Cast Iron Grades

No. 1 cupola	*32.00-33.00*
Unstripped motor blocks	22.00-23.00
Heavy breakable	*33.00-34.00*

Stainless Steel

18-8 sheets, clips solids	200.00-210.00
18-8 borings, turnings.	95.00-100.00
430 sheets, clips, solids.	75.00-80.00
410 sheets, clips, solids.	65.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting..	23.00-23.25
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*17.50-18.00*
Machine shop turnings	*12.00-12.50*
Mixed borings, turnings	15.00-16.00
Short shovel turnings..	16.00-17.00
No. 1 cast	30.00-31.00
Mixed cupola cast	28.00-29.00
No. 1 machinery cast..	33.00-34.00

BUFFALO

No. 1 heavy melting...	32.00-33.00
No. 2 heavy melting...	27.50-28.50
No. 1 bundles	32.00-33.00
No. 2 bundles	25.50-26.50
No. 1 busheling	32.00-33.00
Mixed borings, turnings	20.50-21.50
Machine shop turnings.	19.00-20.00
Short shovel turnings..	21.50-22.50
Cast iron borings	20.50-21.50
Low phos.	36.00-37.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	42.00-43.00

Railroad Scrap

Rails, random lengths..	35.00-36.00
Rails, 3 ft and under..	42.00-43.00
Railroad specialties	36.50-37.50

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting...	33.00-34.00
No. 2 heavy melting...	29.50-30.50
No. 1 bundles	33.00-34.00
No. 2 bundles	24.00-25.00
No. 1 busheling	33.00-34.00
Machine shop turnings.	19.00-20.00
Mixed borings, turnings	19.00-20.50
Short shovel turnings..	22.00-23.00
Cast iron borings	20.00-21.00
Low phos. 18-in.	35.00-39.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Heavy breakable cast..	35.00
Charging box cast	36.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
Rails, 18-in. and under	45.00-46.00
Rails, random lengths..	40.00-41.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting...	31.00
No. 2 heavy melting...	29.00
No. 1 bundles	31.00
No. 2 bundles	24.50
Machine shop turnings.	15.00
Short shovel turnings..	17.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	32.50
Heavy breakable cast..	32.50
Unstripped motor blocks	32.50
Brake shoes	32.00
Clean auto cast	*42.00*
Stove plate	36.50

Railroad Scrap

No. 1 R.R. heavy melt	*36.50*
Rails, 18-in. and under	46.00
Rails, random lengths.	40.00-41.00
Rails, rerolling	*48.00*
Angles, splice bars	41.00

SEATTLE

(Delivered consumer plant)

No. 1 heavy melting...	33.00
No. 2 heavy melting...	29.00
No. 1 bundles	*25.00*
No. 2 bundles	*21.00*
No. 3 bundles	*16.00*
Machine shop turnings.	12.00-14.00
Mixed borings, turnings	12.00-14.00
Short shovel turnings..	12.00-14.00
Electric furnace, No. 1	*35.00-37.00*

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	*35.00-37.00*
Heavy breakable cast	*28.00*
Unstripped motor blocks	27.00
No. 1 wheels	21.00
Stove plate (f.o.b. plant)	28.00-29.00
Brake shoes	28.00-29.00

Railroad Scrap

(Delivered consumer plant)

Rails, random lengths..	30.00-34.00

LOS ANGELES

No. 1 heavy melting...	28.00
No. 2 heavy melting...	24.00
No. 1 bundles	27.00
No. 2 bundles	22.00
Machine shop turnings.	8.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	42.00-44.00

SAN FRANCISCO

No. 1 heavy melting...	27.00
No. 2 heavy melting...	25.00
No. 1 bundles	26.00
No. 2 bundles	22.00
No. 1 busheling	27.00
Machine shop turnings.	8.00
Mixed borings, turnings	8.00
Short shovel turnings..	10.00
Cast iron borings	10.00
Cut structurals	27.00
Heavy turnings	9.00
Punchings & plate scrap	27.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast..	36.00
Unstripped motor blocks	30.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop Broken machinery	48.00

HAMILTON, ONT.

(Delivered prices)

No. 1 heavy melting	*34.00*
No. 2 heavy melting	*31.00*
No. 1 bundles	*34.00*
No. 2 bundles	*28.00*
Mixed steel scrap	*28.00*
Mixed borings, turnings	*16.00*
Rails, remelting	*43.00*
Busheling, new factory:	
Prepared	*32.00*
Unprepared	*28.00*
Short steel turnings	*16.00*

Cast Iron Grades†

No. 1 machinery cast..	42.00-45.00

†F.o.b., shipping point.

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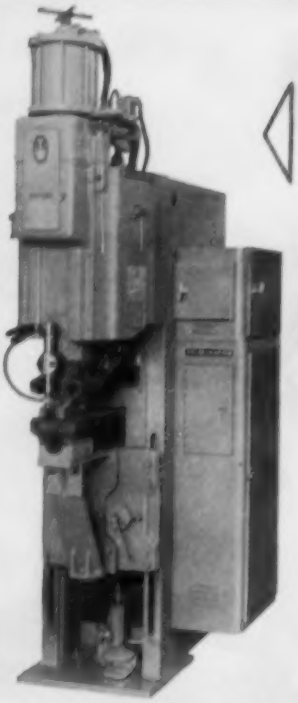

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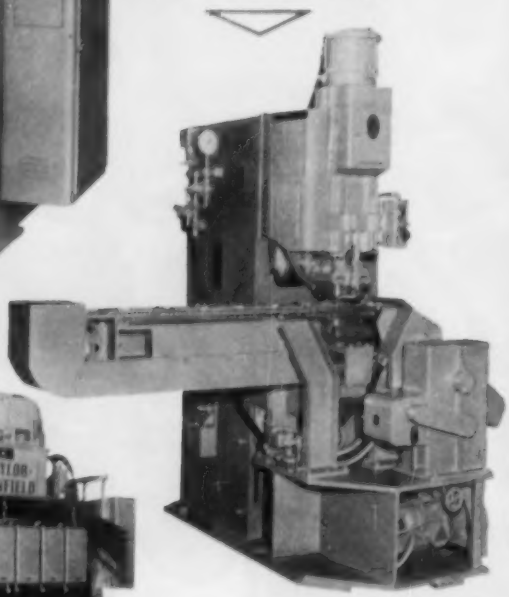

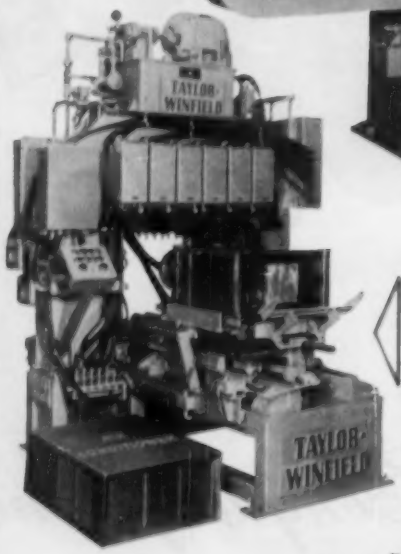

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lowest for the month since 1950. Shipments were all rail, including 68,499 tons from the Lake Superior district. Production was at the rate of 99.8 per cent and shipments at the rate of 112.2 per cent of the January 1947-49 averages.

Mine stocks totaled 8,023,266 gross tons in January, 87 per cent being held in the Lake Superior district, 1 per cent in the Southeast, 6 per cent in the Northeast and 6 per cent in the West.

Structural Shapes . . .

Structural Shape Prices, Page 152

Producers of wide-flange structurals are virtually sold out for the second quarter, but they are in better delivery position on standard shapes. Some still are able to book a little standard tonnage for late May shipment, though others hold bookings extending into July. On wide-flange sections, bookings extend into the third quarter.

Construction firms are receiving steel shipments on schedule, but they're having difficulty placing forward orders. In January, shipment promises of six to eight weeks were made by the mills. Now, the same makers are quoting 10 to 12 weeks. Until recently, the shape producers were sending copies of their mill rolling schedules to fabricators. This practice has been stopped for the present at least.

Structural business in general is active and appears increasingly diversified. While still important, bridge demand is off somewhat. However, the slackening is being offset by rising demands from other consuming areas.

Additional large contracts for fabricated bridge steel in New England narrows remaining tonnage required for the Massachusetts turnpike to approximately 20,000 tons. Some 40,000 tons, including reinforcing, for this job already have been widely distributed. The Connecticut highway program will come out later this year. It will include 240 grade separations, 37 stream crossings and 11 viaducts. Pending also in New England are 16,000 tons for a tunnel section, Central Artery, Boston.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3815 tons, Sheraton hotel, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

3700 tons, bridge, Massachusetts turnpike, Westfield river, Russell, Mass., to Mount Vernon Bridge Co., Mt. Vernon, O., through Daniel O'Connell's Sons Co., Holyoke, Mass., general contractor.

2470 tons, 5-span girder, Chicopee river, and 4-span stringer, Three Mile River Road, Massachusetts turnpike, Ludlow-Wilbraham-Palmer, Mass., to Phoenix Bridge Co., Phoenixville, Pa., through Brunalli Construction Co., Southington, Conn., and

Grandview Construction Co., Mt. Vernon, N. Y., joint general contractors.

1520 tons, warehouse, Schlitz Brewery, Long Island City, N. Y., through O. Driscoll Construction Co., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

1250 tons, hangar, U. S. naval station, Argentia, Newfoundland, to Belmont Iron Works, Philadelphia; bids on steel direct to Third Naval District, New York.

1240 tons, pier A, Brooklyn, N. Y., through J. Rich Steers Inc., general contractor, to Elizabeth Iron Works Inc., Union, N. J.

835 tons, 12-story apartment, 213-25 E. 69th St., Manhattan, New York, to Dreier Structural Steel Co. Inc., Long Island City, N. Y., through Paul Resnick.

745 tons, bridges, Massachusetts turnpike, Grafton-Millbury, Mass., to A. O. Wilson Structural Co., Cambridge, Mass., through Gilbane Building Co., Providence, R. I., general contractor.

645 tons, junior and senior high school, Elmont, N. Y., through Leon De Matteis Construction Co., general contractor, to Mansfield Steel Co.

397 tons, widening of helical roadway approach to Lincoln tunnel, Jersey City, N. J., through Union Building & Equipment Co., general contractor, to Elizabeth Iron Works Inc., Union, N. J.

355 tons, contract M-26, New Jersey turnpike, Jersey City, N. J., through Raymond Concrete Pile Co., New York, subcontractor, to Albert Pipe Supply Co., Brooklyn.

320 tons, three bridges, Massachusetts turnpike, Otis-Becket, Mass., to Haarmann Structural Steel Co., Holyoke, Mass., through Dane Construction Co., Somerville, Mass., subcontractor for bridges.

315 tons, four state bridges, Manchester, N. H., to Phoenix Bridge Co., Phoenixville, Pa., Frank Palazzi & Sons Inc., Johnston, R. I., general contractor.

295 tons, addition, U. S. Electrical Motors Inc., Milford, Conn., to Belmont Iron Works, Philadelphia; Leo F. Capront Associates, New Haven, Conn., engineer.

290 tons, automotive maintenance shop, air field base, Portsmouth, N. H., to Groisser & Shlager Iron Works, Somerville, Mass.; George A. Fuller Co., Boston, general contractor; bars to Northern Steel Co., Medford, Mass.

275 tons, junior and senior high school, Columbia, Pa., to High Welding Co., Lancaster, Pa.

225 tons, including long-span joists, factory, Old Town Shoe Co., Bangor, Me., to Bancroft & Martin Rolling Mills Co., South Portland, Me.; also reinforcing bars; J. F. Rand & Son, Boston, general contractor.

145 tons, Edward Gottschalk Junior High School, Louisville, Ky., to International Steel Co., Evansville, Ind.; Leo C. Miller Co., Louisville, general contractor; also 195 tons, bar joists, Laclede Steel Co., St. Louis, and 90 tons, reinforcing bars, to American Builders Supply Co., Louisville.

125 tons, office building, General Electric Co., Schenectady, N. Y., to Whitehead & Kales Co., Detroit.

100 tons, intake duct, Woodridge, N. J., through Mahoney Truast Co., general contractor, to National Iron Works, Jersey City, N. J.

STRUCTURAL STEEL PENDING

16,000 tons, expressway tunnel frames, Central artery, Boston; bids Apr. 26, State Department of Public Works, Boston.

3900 tons, state turnpike, Burlington county, N. J.; bids Apr. 20.

1200 tons, telephone structure, Seattle; bids Apr. 19.

890 tons, four bridges, Massachusetts turnpike, Sturbridge, Mass.; Clark, Farrell & Rodgers, Memphis, Tenn., low on general contract.

285 tons, state bridge over Maine Central railroad, Winthrop, Me.; also 110 tons of reinforcing steel.

258 tons, state railroad overcrossing, Spokane, Wash.; bids in at Olympia, Wash.

140 tons, I-beams, Navy Purchasing Office, Washington; bids Apr. 22.

REINFORCING BARS . . .

REINFORCING BARS PLACED

500 tons, Capitol Square building additions, Atlanta, Ga., to Atlantic Steel Co., Atlanta.

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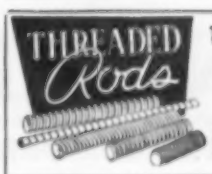

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Heavy background in Metal Industry covering all phases as Works Manager, Chief Production Engineer, Assistant Chief Engineer in the white appliances. Seasoned in government contracting, labor relations, factory cost, purchasing, capital equipment, and all phases of Manufacturing, Engineering and Sales. Reply Box 240, STEEL, Penton Building, Cleveland 13, Ohio.

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FOR SALE

One Automatic Cut-Off Shear, Capacity 48" wide x 16 gauge, consisting of shear roll feed with straightener and uncoiling equipment. In excellent condition, operated less than four years. Reply Box 239, STEEL, Penton Building, Cleveland 13, Ohio.

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lanta; Thompson & Street Co., Atlanta, general contractor.

265 tons, school board warehouse, Seattle, to Bethlehem Pacific Coast Steel Corp., Seattle; Howard S. Wright & Co., Seattle, general contractor.

190 tons, sheet piling, drainage, Northeast expressway, Chelsea, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Ralph Richard Co., Dedham, Mass., general contractor; 30 tons, 48-in. steel pipe, Walsh-Holyoke Boiler Works, Holyoke, Mass.

133 tons, Montana state bridge, Columbia Falls, to Bethlehem Pacific Coast Steel Corp., Seattle; Hansen & Parr, Spokane, general contractor.

115 tons, grain elevator, Sprague, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; E. R. Haynes, general contractor.

110 tons, widening Dorchester Bay bridge, Boston, to Northern Steel Co., Medford, Mass.; F. E. Daddaro Corp., Boston, general contractor; also 85 tons of fabricated structural steel to American Bridge Division, U. S. Steel Corp., Pittsburgh.

100 tons, two Tradewell shopping centers, Seattle area, to Northwest Steel Rolling Mills Inc., Seattle.

REINFORCING BARS PENDING

565 tons, four bridges, Massachusetts turnpike, Sturbridge, Mass.; Clark, Farrel & Rodgers, Memphis, Tenn., low on general contract.

120 tons, guardhouse, Ft. Lewis, Wash.; Macdonald Bldg. Co., Tacoma, Wash., low at $550,297 to U. S. Engineer.

115 tons, including shapes, laterals, pumping plants, concrete pipe, etc., Columbia Basin project; bids to Bureau of Reclamation, Ephrata, Wash., May 12.

85 tons, Washington state, two bridges, Spokane county; O. M. Chaplin, Spokane, low at $59,223.

PLATES . . .

PLATES PLACED

2100 tons, floating roof tanks, Esso Standard Oil Co., Bayway, N. J., to Hammond Iron Works, Warren, Pa.

1925 tons, tank work, Esso Standard Oil Co., to unnamed fabricators; of total 1100 tons are for tanks at Norfolk, Va., and 825 tons for tanks at Charleston, S. C.

385 tons, tank, Shell Oil Co., Sewaren, N. J., to Hammond Iron Works, Warren, Pa.

PLATES PENDING

560 tons, hull, medium tensile, black, uncoated; bids Apr. 25, General Stores Supply Office, Navy, Philadelphia.

450 tons, fuel storage tanks, Adak, Alaska; Rober & Kief, Seattle, low at $1,168,975 and $899,675, respectively, on two schedules.

100 tons plus, fuel storage, Fairchild Air Field, Washington state; installation bids Apr. 25; plates and tanks furnished by government.

PIPE . . .

CAST IRON PIPE PLACED

1194 tons, 6 to 12 in., for Yakima, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

174 tons, system expansion, Quincy, Wash., to U. S. Pipe & Foundry Co., Seattle.

91 tons, to Pacific States Cast Iron Pipe Co., by Milwaukie, Oreg.

CAST IRON PIPE PENDING

62 tons, for Port Angeles, Wash.; bids in Apr. 7.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Directorate of Turkish State Railways, 30 diesel road locomotives; bids asked.

Iranian State Railways, 20 to 50 diesel locomotives; contemplated.

RAILROAD CARS PLACED

Chesapeake & Ohio, 500 fifty-ton box cars, divided equally between ACF Industries Inc., New York, and the Pullman-Standard Car Mfg. Co., Chicago.

RAILROAD CARS PENDING

Erie, 500 fifty-ton box cars. This inquiry was previously referred to as involving 300 box cars.

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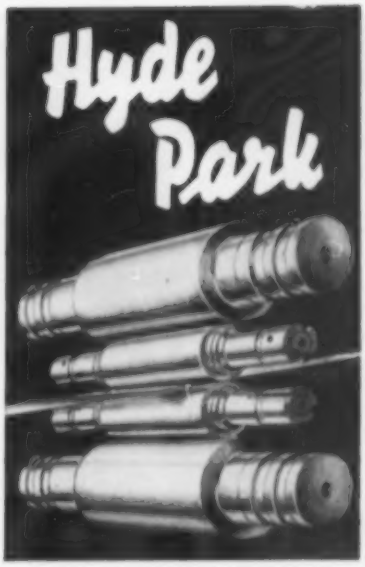

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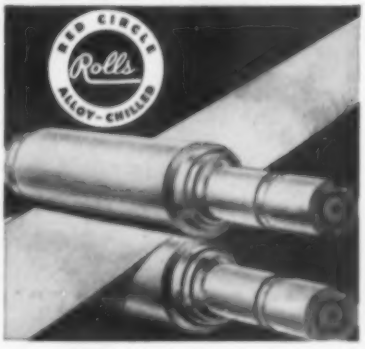

Eagle-eyed hunter in the sheet mill

This is Matt, training his eagle eye on a run of new steel sheets. He scans each sheet very carefully to be sure it comes up to Bethlehem quality standards. For Matt is an inspector at our Lackawanna sheet mills, and it's his responsibility to hunt down any sheets that cannot make the grade.

The great majority of sheets, of course, pass his keen appraisal with flying colors. Quality is the watchword at Lackawanna, and it's Matt who has to decide which sheets will meet the customer's needs, and which should go to the reject pile.

As at Lackawanna, so at Sparrows Point. The men who make the sheets at both these plants are keen and quality-minded men. Men who are proud of their team, proud of their product, and dead set on holding the quality standard high.

When you have a bunch of men imbued with that spirit, given the best tools money can buy and the best steel we know how to make, the product is bound to be good every time. That's why you can look to Bethlehem for sheets that, at the very least, will compare favorably with the best the industry is making. Sheets as finely finished, as easy forming, as true to gage as any on the market. Sheets as fine as you can buy!

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